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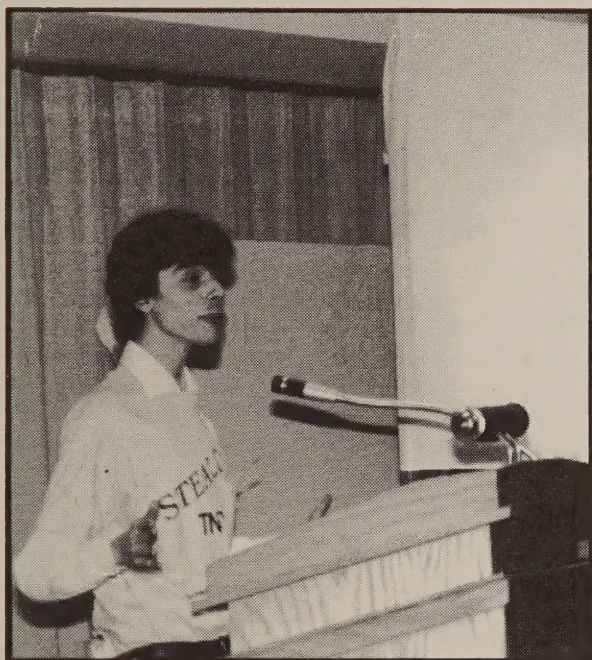
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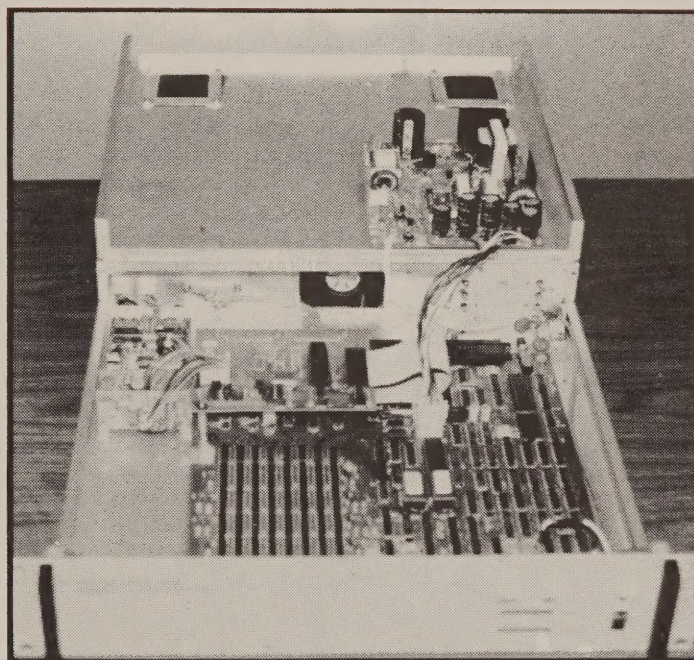
PRM
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PACKET RADIO MAGAZINE

Dedicated to the Advancement of Packet Radio



Howie Goldstein, N2WX



K4GFG's 820 FAD Switch

VAPORWARE CONDENSES AT ORLANDO

PHOTO COVERAGE OF THE FIFTH ARRL AMATEUR RADIO COMPUTER NETWORKING CONFERENCE



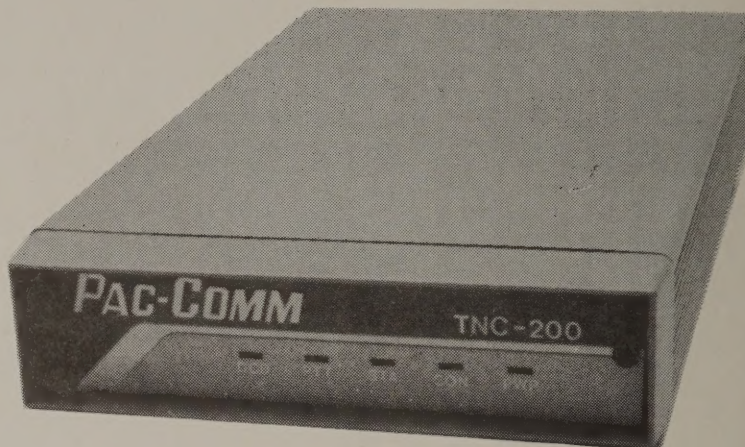
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PACKET RADIO MAGAZINE

PACKET RADIO MAGAZINE is published monthly by the Florida Amateur Digital Communications Association, Inc. (FADCA), 812 Childers Loop, Brandon, FL 33511. (813) 689-3355.

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Asst. Editor - Brad Voss, KE8CW

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Subscriptions to PACKET RADIO MAGAZINE are available through membership in FADCA or other participating clubs. Check the newsletter section for a club in your area, or contact FADCA for individual membership. FADCA membership dues (US Dollars): United States = \$15.00, Canada = \$18.00, Foreign (airmail) \$25.00. (All but \$3.00 of dues is for the subscription to PRM.) Major clubs desiring to participate in PRM should contact the FADCA office.

News and Views

Gwyn Reedy, W1BEL

This month's PRM is chock full of articles and pictures, so I'll keep my part short and save space for the other writers.

CORRECTION: My report last month about K4TKU and the FCC's interest in his unattended HF operation was premature. His letter from the FCC arrived after PRM went to press.

Thanks to all the people that attended the Fifth ARRL Amateur Radio Computer Networking Conference, especially those that presented papers, and above all, to Paul Rinaldo, W4RI, for his management of the Conference in less than ideal conditions.

The cover on this PRM shows Howard Goldstein, N2WX, frequent commentator about the ephemeral qualities of much software (it'll be ready next week; its 95% done, etc) presenting his paper on the level 3 switch software he has written. Both Howie's code and a Xerox 820 version of TCP/IP were demonstrated at Orlando. Also pictured is the very sanitary X820 switch put together by Tom Kneisel, K4GFG. More pictures at the centerfold.

Seen and heard at Orlando (some more tongue in cheek than others): ...Terry Fox, WB4JFI, had a prototype IBM PC card in his briefcase that acts like a TNC....TAPR insiders were wearing 'STEALTH TNC' T-shirts. Wonder what they will unveil at Dayton this year....Pete Eaton demonstrated a major breakthrough in packet operator training aids. Manufacturing problems may keep it from wide distribution for a while, though....Harold Price reported that he is twice as close to version 4 software for the TNC1 as he was the last time he answered that question. He also observed that repeatedly cutting a distance in half never casuses it to reach zero....

PRM continues to expand. Printing is up 50% this month, to 1100 copies. Several major packet clubs are getting ready to join in. FADCA has applied for a second class mailing permit. Beginning next month, your PRM should arrive more quickly and in better condition. Thanks for your patience and support as we go through this rapid growth period. FADCA is getting about 40 pieces of mail each week so it's hard to respond quickly.

Model 100 Terminal Program For GLB PK-1

Joe Buswell, KJ5B [70305,1341]

From CompuServe Information Service Data Library 9.

This is a simple terminal program for the Radio Shack Model-100 that buffers transmit text so it can be sent to a GLP PK1 at machine speed. Baud rate is 600, the maximum the M-100 can handle in Basic. This program prevents the problem of keyboard interrupts interfering with packet reception, at least it minimizes the problem.

```
1 ' PAKGLB.BA v1.0 Transmit Text buffer for GLB PK1
2 ' and RS Mod. 100. c 1984 Joe Buswell, K5JB
3 ' Permission is given to freely distribute this
4 ' program for non commercial purposes. Received
5 ' text is unbuffered. To redisplay entered text,
6 ' use Ctrl-D. Because the M-100 intercepts Ctrl-C,
7 ' disconnect with function key 8 (or ESC ESC,
8 ' followed by AD for auto disconnect). Echo is
9 ' disabled because the GLB cannot take text at
10' machine speeds while echoing. Note that fun-
11' ction key 2 transmits buffered text. Transfer
12' rate is 600 Baud. For short strings (128 char?)
13' 1200 Baud will work...enjoy, K5JB
```

```
15 CLEAR 1000:CLS:COM ON:KEY ON
20 GOSUB 800:' DISPLAY COMMANDS
30 OPEN"COM:47I1E" FOR INPUT AS 2:OPEN"COM:47I1E"
   FOR OUTPUT AS 1:'600 BAUD
40 INPUT"SETUP (Y/N)";RS:IF RS="Y" THEN GOSUB 500
50 ON KEY GOSUB 200,300,,,,800,700:'
   EDIT,XMIT,,,,COMMANDS,DISC
60 ON COM GOSUB 400:' COMMUNICATION INTERRUPT
100 PRINT"YOU GOT IT!":' INTERACTIVE MODE
110 ES=INKEY$
120 PRINT#1,ES;
130 PRINT ES;:IF ES=CHR$(13) THEN PRINT ':' TIDY UP
   SCREEN
140 GOTO 110
200 PRINT"EDIT:"
210 AS=INKEY$:PRINT AS;
220 IF AS="" THEN 210
230 IF AS=CHR$(1) THEN GOSUB 300:' TRANSMIT (ALSO
   USE F-2)
240 IF AS=CHR$(4) THEN PRINT " "+BS;:' REDISPLAY WITH
   CTRL=D
250 IF AS=CHR$(27) THEN PRINT" LEAVE EDIT":RETURN ':'
   ESC
260 IF AS=CHR$(13) THEN PRINT:AS=AS+" ":"THROW AWAY
   SPACE
```


Dayton Packet Forums

Tentative Plan for Dayton Hamvention packet radio forums according to Bob Neben, forum organizer. He hopes to have Room 1 on Friday April 25th with the first Forum running from 1300-1445 and the second forum running from 1500-1700.

PACKET RADIO FORUM I Packet Radio Fundamentals and Tutorial

Bob Neben, K9BL Introduction (5 min)
Pete Eaton, WB9FLW Packet Fundamentals (75 min)
Jon Bloom, KE3Z The ARRL and Packet Radio (30 m)

PACKET RADIO FORUM II Packet Radio Technical Developments

Lyle Johnson, WA7GXD Update on TAPR (1 hour)
Harold Price, NK6K PACSAT Update (1 hour)

The Hamvention book listing the Forums will show the two Forums separately with their respective times. This may stop folks from leaving early, and allow oldtimers to bypass the first part and come to the more Technical talks in the second forum.

Bob is also setting up another informal get together for Saturday night. Stop by the TAPR Booth (same spot as last year) during the Hamvention for directions and time.

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by Jim Grubbs, K9EI



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Updates to the FADCA Network Connectivity Matrix:

FTL - Out of Service

HWD - BCR Excellent

HWD - WPB Fair

HWD - MIA Excellent

Network test sites:

904JAX (JAX-0) (JAX is still operative as JAX-1)

904OCF (OCF)

813CLW (CLW) (KC2FF-7 is still operative)

813TPA (TPA)

305MLB (MLB)

305STU (STU)

305HWD (HWD) (temporary site)

Revise the digipeater map (Feb edition) to show the callsign of TLH as WA4DSW.

Kantronics KPC-2

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NOW — AX.25 VERSION 2 for ANY computer, the Packet Communicator II

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BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
Waiver of Section 97.80(b) and)
97.114(b)(4) of the Amateur)
Rules to Permit the Retransmission)
of Third-Party Traffic in Certain)
Situations)

PR Docket No. 85-105
ORDER

Adopted: March 14, 1986 Released: March 14, 1986

By the Chief, Private Radio Bureau:

1. On February 28, 1986, the American Radio Relay League, Inc. (ARRL) filed a petition for Extraordinary Relief requesting the Commission to temporarily waive Sections 97.80(b) and 97.114(b)(4) of the Rules to permit amateur stations operating in a packet radio network under automatic control to retransmit third-party traffic. The requested waiver would terminate when the Commission adopts a final Order disposing of the petitions for reconsideration filed in PR Docket No. 85-105.[1] In that proceeding, the Commission authorized automatic control for stations transmitting digital communications on amateur frequencies above 50 MHz, but noted that the transmissions of third-party traffic by such stations would require the supervision of the control operator.[2]

2. The prohibition against unsupervised third-party traffic has served to ensure that amateur facilities and frequencies are not used by non-amateurs. Only a person who has demonstrated the proper qualifications may be a control operator of an amateur station. Such control operators screen any third-party traffic to prevent transmissions which are prohibited by Subpart E of the Amateur Rules.

3. Those prohibitions include, but are not limited to, business communications, secret messages, radiocommunications for unlawful purposes and radiocommunication with nations which have not assented to third-party traffic. Self-policing has long been a cornerstone in the integrity of the amateur service. The presense of the responsible licensed control operator at each station has been a vital element in the amateur self-policing tradition. But ARRL, in the instant petition and in its related petition for reconsideration in this proceeding, argues that this safeguard is neither practical nor effective in the context of packet radio technology.

3. In support of the instant petition the ARRL said that the effect of application of traditional third-party traffic control operator requirements to amateur packet radio would severely limit the development of this network for the rapid and accurate relaying of messages and data. The ARRL requested the waiver only for packet radio digital

communications using, or compatible with, their AX.25 protocol.[3] The waiver requested by ARRL only relates to the retransmission of messages already properly screened; a control operator will still be required at every amateur station introducing messages into a packet radio system.

4. In view of the above, we believe a temporary waiver is in order until the Commission has evaluated the arguments presented in the subject petitions for reconsideration and issued a ruling on them. Packet radio in the Amateur Service is in the developmental stages. Although interest in this area is intense and growing, there are still only about 14,000 stations, or about 3% of those licensed, equipped for packet radio operation. Thus the risks of abuse are minimized by the small scope of packet operation which will obtain during the period of this waiver. In the interim, more experience can be gained with automatic control of stations retransmitting with the AX.25 protocol.

5. Accordingly, the waiver request of the ARRL IS GRANTED to the following extent:

(a) The provisions of section 97.80(b) and 97.114(b)(4) are waived to permit amateur stations, retransmitting digital packet radio communications (see Section 97.69) on frequencies 50 MHz and above, using the AX.25 (or compatible) protocol, to be operated under automatic control while retransmitting third-party traffic. See Section 97.3(v).

(b) This waiver applies only to the retransmission of third-party traffic originated at another amateur station which is under local control or remote control. See Section 97.3(m).

(c) When an amateur station is operated under automatic control, devices must be installed and procedures implemented which will ensure compliance with the rules, when the control operator is not present at the control point of the amateur station. See Section 97.80(a).

(d) This waiver will remain in effect until the Commission takes final action on the petitions for reconsideration filed in PR Docket 85-105.

6. Control operators of amateur stations capable of monitoring AX.25 packet transmissions must be alert to the increased dependency upon them for monitoring during the period of this waiver. We call upon them to immediately make known to the responsible control operator of a station retransmitting communications under automatic control any misuse of the station so that the control operator can take prompt corrective action.

[Signed]
Robert S. Foosaner
Chief, Private Radio Bureau

[1] Report and Order in PR Docket No. 85-105, adopted January 13, 1986; FCC 86-18; 51 Fed. Reg. 3069, January 23, 1986.

[2] See Sections 97.69(d) and 97.114(b)(4) of the Amateur Rules.

[3] See AX.25 "Amateur Packet Radio Link-Layer Protocol": Version 2.0, Copyright 1984 by the American Radio Relay League; October 1984.

Alanet Notes

Jim S. Griffith, WA5RAX

The second meeting of Alabama packeteers was held at Alabama State University on January 25. Over 40 amateurs were present. In summary the following activities occurred:

The name "ALA-NET" was adopted for the Alabama State Packet Organization. It was agreed that Alabama would be divided into four major east-west LANs. Each LAN has a Director and a Vice Director to represent them. WD4CPF was chosen as the at-large director. Five members of Ala-Net were chosen to coordinate digipeaters and BBSs and interface to the Alabama Repeater Council for frequency coordination. The frequencies of 145.07 and 145.67 were established as the frequencies to be used by the four LANs that cover the state with all local traffic moving off of 145.01.

The four areas are as follows:

The Northern East-West LAN will operate on 145.07 mhz and is made of Cherokee, Colbert, De Kalb, Etowah, Franklin, Jackson, Lauderdale, Lawrence, Limestone, Madison, Marshall, and Morgan counties. W4HFU Director, WB4ZKX Vice-Director.

The Central East-West LAN will operate on 145.67 mhz and is made of Bibb, Blount, Calhoun, Clay, Cleburne, Cullman, Fayette, Jefferson, Lamar, Marion, Pickens, Randolph, Shelby, St. Clair, Talladega, Tuscaloosa, Walker, and Winston counties. K4HAL Director, WA5RAX Vice-Director.

The Capital East-West LAN will operate on 145.07 mhz and is made of Autauga, Bullock, Chambers, Chilton, Choctaw, Coosa, Dallas, Elmore, Greene, Hale, Lee, Lowndes, Macon, Montgomery, Morenga, Perry, Russell, Sumter, Tallapoosa, and Wilcox counties. N4HY Director, WB4OZN Vice-Director.

The Southern East-West LAN will operate on 145.67 mhz and is made of Baldwin, Barbour, Butler, Clarke, Coffee, Conecuh, Covington, Crenshaw, Dale, Escambia, Henry, Geneva, Houston, Mobile, Monroe, Pike, and Washington counties. N4JAG Director, WB4RHO Vice-Director.

Hence, we have four LAN areas with each one containing a major Alabama metropolitan area. Sub-LAN frequencies have also been coordinated. To complete the grid a high speed 448.4 link is being established on a north/south basis throughout Alabama with its main emphasis being to connect the BBSs. A recent donation of Boeing 25 watt model 700 digital transceivers to the Huntsville Amateur Radio Club are being used for this purpose. David, N4KTY, and others in the Huntsville Club have developed step by step modifications for these transceivers to handle 9600 baud. Coordinated sites have been chosen and approvals given for establishing these units at key interstate boundaries as well as tall towers throughout the state. Most LANs are now in the process of performing the needed modifications on their units with the 448 mhz link expected to be completed by early summer. Many of the two port 820 devices are being replaced with the new TNC-2 two port units.

One of the next ALA-NET meetings is being scheduled for the Birmingham Hamfest in early May. See you all there.

The following is forwarded from the W3IWI BBS:

FCC 85-105: Important news

The FCC Report and Order 85-105 has been the source of considerable concern to the packet radio community. This action, which was to take effect this weekend, would have required a control operator to be present whenever 3rd party was being handled. Since the definition of 3rd party traffic is very specific, this could have been interpreted as prohibiting essentially all packet radio activity. In addition to petitions for reconsideration filed by many individuals and organizations, on Feb.28 the ARRL filed a petition for "Extraordinary Relief" to hold the FCC actions in abeyance until the petitions for reconsideration are considered.

From W1AW via OBS W2JUP Farmingville NY 3/14/86---
1830EST

QST DE W1AW

HR ARRL BULLETIN NR 19 FROM ARRL HEADQUARTERS

NEWINGTON CT MARCH 14, 1986

TO ALL RADIO AMATEURS BT

VHF PACKET RADIO GOT A BIG BOOST TODAY. AT ARRL REQUEST, THE FCC SUSPENDED PARTS OF ITS RULES TO PERMIT THIRD PARTY TRAFFIC BY PACKET STATIONS UNDER AUTOMATIC CONTROL. SEVERAL CONDITIONS ARE ATTACHED TO THE WAIVER, PROVISIONS OF SEC 97.80(b) AND 97.114(b)(4), WHICH WERE BOTH TO BE ADDED TO THE RULES MARCH 14, ARE WAIVED TO PERMIT AMATEUR STATIONS RETRANSMITTING DIGITAL PACKET RADIO COMMUNICATIONS ON 50 MHZ AND HIGHER BANDS USING AX.25 OR COMPATIBLE PROTOCOL TO BE OPERATED UNDER AUTOMATIC CONTROL WHILE RETRANSMITTING THIRD PARTY TRAFFIC. THIS WAIVER APPLIES ONLY TO THE RETRANSMISSION OF THIRD PARTY TRAFFIC ORIGINATED AT ANOTHER AMATEUR STATION WHICH IS UNDER LOCAL OR REMOTE CONTROL. WHEN AN AMATEUR STATION IS OPERATED UNDER AUTOMATIC CONTROL, DEVICES MUST BE INSTALLED AND PROCEDURES MUST BE IMPLEMENTED WHICH WILL ENSURE COMPLIANCE WITH THE RULES WHEN THE CONTROL OPERATOR IS NOT PRESENT AT THE CONTROL POINT OF THE AMATEUR STATION. THIS WAIVER WILL REMAIN IN EFFECT UNTIL THE COMMISSION TAKES FINAL ACTION ON THE PETITIONS FOR RECONSIDERATION FILED IN PR DOCKET 85-105. AMATEUR PACKET OPERATORS MUST BE ALERT TO THE INCREASED DEPENDENCY UPON THEM FOR MONITORING DURING THE PERIOD OF THIS WAIVER. THEY SHOULD IMMEDIATELY MAKE KNOWN TO THE RESPONSIBLE CONTROL OPERATOR OF AN AUTOMATIC PACKET STATION ANY MISUSE OF HIS STATION SO THE LICENSEE CAN TAKE CORRECTIVE ACTION. IN SUMMARY, VHF PACKET RADIO MAY CONTINUE UNDER AUTOMATIC CONTROL AR

BEWARE THE IDES OF MARCH!

Unlike a fellow named Julius, the Ides of March bode well for Amateur packet radio. The Fifth ARRL Computer Networking Conference, in Orlando, Florida, was a very positive and significant event. At that meeting, AX25 Level Three was demonstrated on some TNC 2s (using software developed by Howie Goldstein, N2WX). Not to be outdone, the datagram crew demonstrated TCP/IP running on various machines including a Xerox (tm) 820.

Why is this significant? Because networking is the next logical step in the evolution of Amateur packet radio, and these two groups demonstrated that networking is upon us in a very real sense.

Why do we need networking? If you live in a crowded area (as far as packet activity is concerned), you have probably experienced the frustration of trying to use 145.01 MHz in the early evening, especially if you need to use a digipeater or two. The problem with digipeaters is that they are an extension of level two, and as such require an end-to-end acknowledgment. A level three system, on the other hand, will use point-to-point acknowledgments.

What this means is simply that, if you send a packet to a distant station via one (or more) relaying stations, and if the channel is not perfect, your data will get to its destination quicker if networking is in place. Contrast this to the present situation where a crowded channel can be rendered almost completely useless if digipeaters are needed to complete the desired connection or path.

THE TAPR NNC - AN UPDATE

The Network Node Controller (NNC) is a specialized piece of computer hardware designed to help advance the pace of network development and implementation. See previous columns and articles in Packet Radio Magazine for a description of this device.

Last month I promised you an update of NNC development activity -- here it is!

The hardware has been verified, corrections made to the main printed circuit board (PCB), and a prototype PCB reflecting the changes is undergoing construction as I write this. The floppy disk controller PCB has been constructed and tested (it works!). The modem PCB has been constructed and the artwork for the next version of the PCB is being generated (it didn't work...).

Naturally, the digital hardware is only part of the story. In fact, surprising as it may seem, the software that I hope will soon be running on the NNC is also only a part of the story. The third part, in some ways eclipsing everything else, involves radios. In our world of packet communications, modems may be a more correct term.

It is a relatively easy matter to generate a stream of bits in a computer. We do it all the time with our existing TNCs. Networking software, embryonic though it may be, exists and is being refined. The NNC project, with digital hardware to be shipped to the initial "Alpha" software developers about the time this appears in print, will help act as a focal point to spur the software effort onward.

But you can only send so much data at 1200 bits per second (bps). And even less at 300 bps on HF. The NNC modem board has three 1200 bps ports and one 300 bps port (which can be reconfigured to 1200 bps). While multiports will certainly help ease channel congestion, these are still abysmally slow ports.

Recognizing this, TAPR has underway a radio design effort to produce a 9600 bps radio as well as a 56 kbps (kilo bps) radio to operate in the 220 MHz band. The TAPR Board of Directors approved initial funding of \$1,000 to aid in this effort, headed up by Steve Goode, K9NG.

In addition, there are ongoing negotiations with a satellite communications company to license certain advanced modem technology for Amateur packet use. If everything works out, narrowband "good neighbor" modems with excellent weak-signal performance may emerge in several months' time.

THE HIGH FRONTIER

Sometime in August of this year, a Japanese Amateur satellite, known as JAS-1, should achieve orbit. If all goes well, a few months after launch an on-board packet bulletin board system (PBBS) will be made available to earthbound packeteers.

This PBBS will operate on what is known to the satellite fraternity as Mode J (specifically, Mode J-D). This means that the uplink to the satellite will occur on 2 meters (145 MHz) and the downlink from the satellite will be transmitted on 70 cm (435 Mhz). Mode J is so-named because of the Japanese-built transponder that flew on AMSAT/OSCAR-8 back in 1978 which first used this frequency scheme in Amateur satellites.

There will be four 2 meter channels running at 1200 baud in a Manchester FM format and a single downlink channel on 70 cm running PSK NRZI. Say what?

In order to simplify the spacecraft design, Manchester format was selected for the uplink channels. This is different than the NRZI format that most Amateur packet activity uses.

The downlink is a different matter. PSK is more energy efficient than FM for data transmission, and power on a satellite is definitely at a premium.

So how do I use this satellite? you might be thinking. That is a question we will answer next month! We will also provide you with some information on RUDAK, a high-flying digipeater...

Until then, happy packeting!

PS - if you are at Dayton in April, be sure to stop by and see us at the TAPR booth!

*****NEW *****

PAK-COMM

***** NEW*****

The PAK-COMM program is written for packet radio terminal controllers. The program enables the operator to enjoy the uses that packet radio offers by taking care of the housekeeping, and provides the little 'extras' that make daily operations easy. Use PAK-COMM for both modem and packet work.

Com Parameters: 300-9600 bps, set port, parity, data bits. A start-up file with pre-defined communication parameters, file transfer protocols, date/time stamp options, operator identification line and space for command macros. Set up many files, pick at run time.

Scrolling Pages: Five pages of receive screen with full cursor control.

Split Screens: Separate transmit and receive screens with full line buffering for the transmit. This will enable you to monitor all channel activity while composing messages. Set split where you wish.

File Transfers: You may use transparent or x-modem protocol. Constant character count is provided to monitor activity.

Command Macros: The Alt function keys are available to send strings of up to 250 characters or timing loops that are sent to the controller in one keystroke. Setup complex rpt chains or BBS logons.

Help Screens: Two individual help screens are available. one is a text file to be modified by the user. A good place for system maps.

And Lots More: Like 5 different date/time formats, operator identification line, log files, 50 page manual and even MORE !

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Bytes From The Write Only Memory

Ted Huf, K4NTA

The big news around Florida this month is the new GATOR 2 Network Node Controllers that are coming on line. Howie N2WX got his on at Melbourne a couple of months ago and this over the last week three more are in service. John, W5HUQ, got 904JAX working in Jacksonville. Ernie, K4OSM, got Ocala, 904OCF on line and I got 305STU up at about the same time. Tom, K4GFG, has 305HWD in operation from a temporary location, and both 813CLW and 813TPA are running with experimental level 3 code on TNC-2 boards. These NNCs are the brainchild of Howie Goldstein, N2WX, and his collaborators in New Jersey. In case anyone does not know it by now, Howie is the author of the software for the TAPR TNC-2 which has become the industry standard TNC. Howie's GATOR 2 software runs on an Xerox 820 computer board with a FAD HDLC board.

There soon will be other GATOR 2 NNCs or switches on around Florida and other states. I know that West Palm Beach, Daytona, Clearwater, Tampa and the Sarasota folks are working on X820 hardware, and some south Georgia interest exists. N2DSY is running the code in Northern New Jersey also.

Operation of a GATOR 2 switch is not hard to learn. You use the switch by connecting with it just like you would connect with any other station. Below are some of Howie's instructions on how it use it.

The pad is activated by connecting to the switch and sending a packet.

```
cmd:CONNECT 305MLB
cmd:*** CONNECTED to 305MLB
{4          [Send a <CR> when you receive the {4.]
gator 2 pad 03100305724 port B
enter: call [, digi1 [, digi2 [, digi3] ] ]
to?
```

Now the pad needs to know who you wish to call. Enter the callsign (along with any ssid) followed by a <CR>.

to?N2WX-1

In some cases the station you want to connect with will not be within direct range of the switch. Gator 2 supports both networked calls and calls using digipeaters.

to?K4AHO,ORL

Above is an example of how to instruct the Melbourne switch to call K4AHO who lives beyond the range of the network layer (but is available via a digipeater.)

Once you've issued a callsign (and optional digipeater parameters) one of three things could happen.

1. Normally you'll get a message like:
*** pad: connection reset

This means the call was successfully completed. It is analogous to a "*** connected" message. Another way you could get a *** pad: connection reset message if the person on the other end reconnects or somehow resets his own link.

2. You get the prompt again

```
enter: call [, digi1 [, digi2 [, digi3] ] ]
to?
```

This will happen under one of two conditions:

- A - the callsign(s) entered was illegal, or
- B - the person you called is already using the pad for a call with someone else. Try again later.

3. You get disconnected ("kicked off")

The person at the other end had CONOK off, was busy, or did not answer (retried out).

We are now using prototype GATOR 2 software. Some of the Level 3 functions are not yet supported. For example, a connection using Level 3 might go like this: to? K4NTA @305STU. The switches would route the packets according to a routing table through as many switches or GATOR 2 NNCs as needed to get to 305STU, but as I said, this software is still being worked on. Until the software is finished, you can instruct a switch to connect with another switch but there is a drawback. Your callsign will not get passed through the second switch. For example, if you tell 305STU to connect with 305MLB, then tell 305MLB to connect to the N2WX-1 MailBox, the MailBox will think that 305STU is the user, not you, because the *** Linked to message says 305STU. While this is a problem with automated stations, it should not be hard to handle between human operators until the software is able to handle the situation correctly.

Florida Network Coordinating Committee Meeting
Minutes, March 8, 1986 (condensed version)
Don Deem, KB4LLO

The fourth meeting of the NCC was conducted at the Orlando Hamfest. Participation was light. At Jim's (K4AHO) suggestion, the group formed three divisions, North Florida, West Florida, and South Florida. Much discussion centered about the lack of LAN participation, and ways to obtain support from the network users.

Continued >>>

Tom, K4GFG, discussed separation between LANs on a common frequency. Several band plans were offered, but no acceptable plan could be achieved using only the existing five frequencies on 145 MHz. A plan providing 125 mile separation, but requiring six frequencies was approved. This will require allocation of a new frequency by the Florida Repeater Council.

The group agreed that the majority of the channel clogging seen today is due to MailBoxes. It was proposed that MailBoxes and other PBBS be put on 220 MHz when such a backbone exists, and accessed via the network or locally by a two meter port. Additional suggestions are encouraged.

Recommended operating practices to reduce channel congestion and increase operating pleasure are:

- 0- Minimize the use of the 'bell' character,
- 0- Eliminate beacons from unattended stations,
- 0- Discourage beacons more frequent than 30 mins,
- 0- Move local QSOs and file transfers off of the digipeater frequency, where possible.
- 0- Seasoned packeteers should provide training about good practices to newcomers.

Encouraging 220 MHz construction progress was reported by many sites.

COMMENTS ON FADCA NETWORKING Jim Diggs, K4AHO

[Jim is a long-time packeteer in Orlando, and a FADCA director. He is no stranger to controversy, and he has submitted this article to foster some additional discussion on network planning. ed.]

We have seen over the last year many proposals for networking for the state of Florida. Some use parallel networks, others use high speed backbone networks on 220 Mhz. All proposals offered so far have steep startup cost and stringent RF equipment requirements. Perhaps there is no other way. This may explain why the networking seems to be moving slowly. I hope to offer some insight into a more practical means of networking, which will happen in stages and allow time to find ways to finance the more expensive systems needed in the future.

I have purposely delayed any changes to the ORL digipeater until I could reason out a way to accomplish the desired goal with the least effort and expense. I also wanted to wait until after the ARRL conference as I felt more information would be available on the packet switch program status. Unfortunately not much was learned directly but much was learned by inference (reading between the lines) in the conference papers published by the ARRL. First I was delighted to learn that the packet switch code had been ported to the TNC2 and was apparently working with only a few bugs. Nothing was learned about the future changes to the switch code, or any apparent timetable of those changes. This was a disappointment until I begin to understand the complexities of the problem as I read the Conference papers. I was suprised to learn of the large RAM memory requirements of the switch code. Also it is

FADCA Packet Frequency Coordinating Committee

Tom Kneisel, K4GFG

FADCA's PFCC met at the Orlando Hamfest, with Jim, K4AHO, Ted, K4NTA, Doug, WB4KGY, Tom, K4GFG, and new member Larry, K4OZS present. Chairman Rick, KB4CIA, resigned due to new work responsibilities. Rick was sorry that he would not be able to meet with us regularly, so thought it best to let someone else fill the position. The PFCC decided to continue functioning without a chairman. K4NTA announced that the FADCA Board of Directors had approved the PFCC to carry out FADCA's frequency coordinating responsibilities to its members and the Florida Repeater Council.

The list of digipeaters reported in last month's BEACON is the list that was sent to the ARRL by the PFCC for inclusion in the new Repeater Directory. It should be out by the Dayton Hamfest, and you can expect a lot of new packet listings across the country.

The PFCC approved a registration form for digipeaters and will be sending it out to all known trustees. It will be the basis of frequency coordination so everyone who currently operates or plans to operate a packet digipeater on any band should complete this form and return it to the PFCC. If you don't receive a form in the mail by April 5, write to the PFCC at 812 Childers Loop, Brandon, Fla. 33511.

K4AHO will be looking into what the other packet coordinating groups are doing across the country, and WB4KGY was appointed to be our liason to the Florida Repeater Council. The PFCC has received several requests for coordination of digipeaters on 6m, 220 Mhz, and 440 Mhz, and is working on those with the FRC. We should have some news on packet options for the other bands next month. Again, if you wish to request a coordinated frequency for your packet operation, the first step is to complete the PFCC registration form and return it.

The two meter frequency coordination plan presented last month was discussed at the Florida Network Coordinating Meeting in Orlando. There was significant negative feedback on the 85 mile co-channel separation rule, and the group recommended that the PFCC implement a 125 mile plan. K4GFG will complete a 125 mile plan and present it to the Committee as soon as possible. In the meanwhile, any suggestions or proposals from users will be welcome.

apparent that BOTH the TNC2 and Xerox 820 (with FAD board) are primitive switches without any routing code at all. With the 64K memory limitations of either machine there may not be room for a full blown packet switch on either the TNC2 or the Xerox 820. I believe any attempt to put two port packet switch code on the Xerox or the TNC2 is a waste of time. There is simply not enough memory. This being the case I believe our time would be better spent using the TNC2 with its battery backed, low power consumption circuitry as a simple packet switch,

single port, no routing, linked station ID forwarding system. The present memory can be easily expanded to equal the Xerox with the NEC 32K x 8 Static RAM. Presently this chip is expensive but rapidly falling in price. I was quoted a price of \$67 each, with a purchase of two. The TNC2 is reliable and well suited for remote digipeator/switch operation. A totally battery-backed switch is practical.

I believe a system of packet switches on 145.01 MHZ and a system of LAN frequencies (used for local chit-chat and local BBS use) would be a reasonable intermediate approach to networking for Florida. I also believe the next big programming effort should be porting the X.75 packet switch code to the TAPR NNC. This machine is the next best answer for switch memory requirements as it can address more than 64K memory in banks. Whether this would meet the memory requirements experience can only tell, but the SCSI interface can be used with a hard disk. The hard disk may make up for the shortcomings of bank switching and is more practical for remote operation than a floppy disk. This system should really be our goal rather than a two port Xerox. The hardware exist, is not terribly expensive, and ready for multiple port operation. The possibilities of expansion of the NNC are the best available at this time. The NNC is the best approach for networking in Florida for the next several years. Better hardware may come later but nothing appears on the horizon at this time.

With these thoughts in mind I offer the following plan by steps.

1. Establish the TNC2 as the standard switch hardware for the Florida networking system.
2. Finalize the present switch code for the TNC2 by taking advantage of the 32K memory expansion and adding the code to pass linking station identification.
3. Port the TNC2/XEROX code to the TAPR NNC and establish Beta test sites.
4. Add the routing and two port code to the NNC utilizing the bank switching memory expansion. This code should allow for remote uploading of routing tables.
5. Upgrade the standard Florida networking system hardware to the TAPR NNC.

This approach seems to leave the Xerox out in the cold. But consider this, the Xerox does not lend itself to battery backed operation. It is physically large and has questionable reliability. The addition of the FAD.PAD board certainly does not add to the reliability. The 64K memory limitation makes it use as an intelligent two port switch questionable at best. And using two ports would certainly preclude routing tables. The Xerox serves well as a development tool but not much else. The TNC2 certainly has some of the same limitations but can be battery backed and has good reliability. It is small and can directly replace TNC1s and GLB PKT1s. The immediate result of this approach is that we will have a packet switch backbone on 145.01 MHZ and will gain much experience with packet X.75 switching. If efforts are started immediately to port the present switch code to the TAPR NNC, perhaps some of the present Xerox switches can be traded out with NNCs rather than TNC2s as an intermediate step. As good

sites are hard to come by and the networking system is short on redundant paths every machine is needed. The NNCs will make the addition of the second port on 220MHZ much easier and more reliable by step by step expansion of present sites. This proposal is certainly nothing new. It is only a review of the path we seem to be on by default. This path seems to lead away from the Xerox and to the TAPR NNC. I hope everyone can see the long term benefits of this path and stop resisting the NNC with the excuse of no software. It simply isn't true. Howie's switch code would do well on the NNC and give plenty of room for future expansion that we will so desperately need. Now is the time to stop waiting on further developments of the Xerox code and press on with the NNCs.

Things go better with color ...

The TNC-2 is equipped with 5 red Light Emitting Diodes (LEDs) to let you monitor the TNC's status during your daily use. From right to left they are:

- PWR (Power On - should be lit all the time!);
- CON (Connect indicator - lit when a connect is in effect);
- STA (Status of unacknowledged packets - lit when your TNC's transmit buffer contains unacknowledged packets);
- PTT (Push To Talk indicator - lit when transmitter is keyed);
- DCD (Data Carrier Detect - lit when signals are being received within the audio passband of the TNC modem).

Each of these is important for its own purpose. With the relatively short time constants involved in the traffic we participate in, it is useful to monitor these LEDs and to take appropriate action (change the TNC's command parameters) if the LEDs indicate an unnormal behavior. Like for instance during file transfers via a marginal link the STA LED may not extinguish between packets sent, which may lead to too many packets outstanding and 'death' to your file transfer.

To have a better visual conception of what's going on I decided to add colors to my life:

- RED PWR is OK for power-on indication.
- The CON LED was replaced with a GREEN LED. The green color here is the logical choice to show that the connection is OK.
- The STA LED is an important LED, indicating a status between go and no-go. YELLOW is the logical color for this LED if we stick to the traffic light analogy.
- RED PTT LED is OK, it matches the red 'transmitter on' LED found on many transceivers.
- GREEN DCD LED would be the matching color to the 'receiver busy' LED found on many transceivers.

The idea is free of charge ...73 de LA4LN,

Tom Victor Segalstad



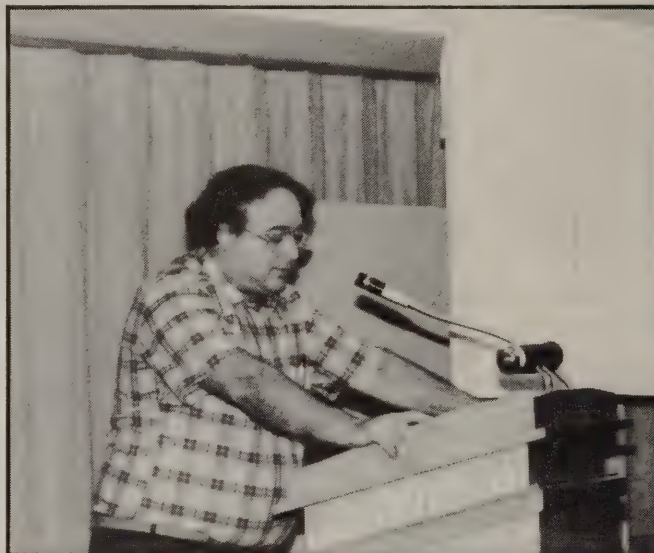
Paul Rinaldo, W4RI, Opening the Fifth ARRL Amateur Radio Computer Networking Conference, March 9, 1986



Fujio Yamashita, JS1UKR, presenting an Outline of Satellite JAS-1



Phil Karn, KA9Q, describing the merits of TCP/IP for amateur networking



Hal Feinstein, WB3KDU, addressing the Conference on "Authentication of the Packet Radio Switch Control Link"



A Bearded Experimenter (Lyle Johnson, WA7GXD) discussing the TAPR Network Node Controller



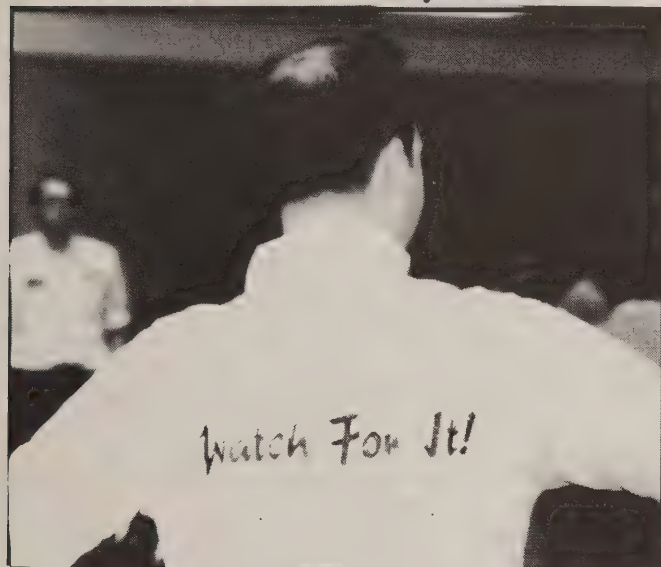
David Cheek, WA5MWD, Presenting his paper, "Automated Traffic Handling Assistance"



The FADCA booth manned by WIBEL's child laborers, Brian and Brandy Braswell



The TAPR Crew in their 'STEALTH TNC' Shirts



An inducement to watch for the 'Stealth TNC' (and a candid view of Pete Eaton's emerging dome)



Tom Moulton, W2VY, setting up a networking demonstration, watched by Ted Huf, K4NTA



The TOP SECRET TAPR Packet Operator Training Aid (Packet Pooper) prior to unveiling



Gwyn Reedy, WIBEL, speaking to the FADCA Membership Meeting

UPRA Connect

Newsletter of the UTAH PACKET RADIO ASSOCIATION

UTAH ACTIVITIES AND GROWTH

Dave Pedersen, N7BHC

Growth of Packet Radio in Utah has slowed down considerably since the end of last year. This trend is going to reverse soon, and interest can be expected to increase in the near future. This is both good and bad!

Renewed interest is good because it will lead even more people to get active on this interesting mode of communications. It is safe to assume that this next group to get active on Packet Radio will be more of the 'user' type person rather than the 'bearded-experimenter' type. This is going to lead to more participants who are out to use Packet Radio to assist them in whatever aspect of amateur radio they are most involved in, rather than just use Packet for Packet's sake. In other words, they will view Packet as a 'means to an end', rather than as an 'end'.

What does this translate to? More use of packet by special interest groups, such as emergency communications or HF DXing groups. Visualize, if you will, an HF DX group having their own dedicated BBS. For example, when someone works or hears a DXpedition on Malpelo, he notes the particulars and operating habits that he observed of the DX station on the 'HFDX BBS'. Several hours later, another HF DXer checks into the BBS, and requests any information on 'Malpelo', sorted in any order he chooses to specify, which is then dumped to him.

Diversification of interests in a group such as UPRA is a good thing. It provides a much wider and more solid foundation to build upon. It maintains a positive growth because everybody will see a need for Packet Radio, and a use for it in their enjoyment of the entire hobby.

Another positive influence on the growth of Packet Radio in Utah is the fact that 1986 is the year in which we are going to reach to our neighbours. Once linked to California alone, the amount of available stations to work will increase by a factor of at least 10.

I said there was a negative side to this whole issue, and here it is. Where will all these people go? We have only five assigned frequencies on the two meter band in Utah, and in no time at all, they will be saturated. After they all become used to capacity, there is only one thing to do. Move!

Where to, you ask? We currently have several frequencies assigned on the 220 MHz band for both narrow and wide bandwidth signals. The wide bandwidth frequencies will also allow for higher data rates, which will also serve to improve channel efficiency.

This all costs money, because radios have to be procured that very few people have, and if higher speed is desired, that increases the cost even more.

There is a low cost solution...the wide open spaces of 50 MHz. The six meter band is probably even more underused than 220 MHz, and simple radio equipment is available for under \$50 per station (new)!

I am, of course, referring to the latest thing to hit the CB market; 49 MHz FM radios of various descriptions are now being sold for \$30 or less each. Very little is needed to modify them for Packet use on the 50 MHz band; essentially just 2 new crystals, retuning and maybe a metal box to put them in. The whole principle has been used in the library of a Californian University for about a year now on 49 MHz, and a working 6m system was discussed at the TAPR meeting in February.

If we act now, we can get 25 or more channels assigned for Packet use on the 6 meter band, giving us room for growth at low cost, and also protecting the band from commercial interests.

See you soon on 6 meters?

UPRA DATA

MEETINGS: Held at the Heathkit Store, at 7200 South State (58E.), on the second Thursday of the month at 7:30 PM. The next meeting will be on April 10th.

VOICE NET: The information dissemination and question/answer net is held on Tuesday evenings at 8.45 p.m., on the 146.02/62 repeater. Net control is Steve, KI7L.

PBBS: There are several PBBS stations now in operation. WA7UZO and KA7EGQ are running the WA7MBL BBS systems with IBM PCs. WA7YAZ is on the air with an Apple based system. All stations are currently on 145.01 MHz.

MEMBERSHIP: UPRA membership dues are \$15 annually. Additional family members sharing a newsletter pay only \$1.00.

NEWSLETTER MATERIAL: This may be sent to the address listed below, or via several electronic routes, which are either ASCII text files on IBM formatted disks or via a BBS. Contact me via the phone number below for more information. Submission deadline is slowly creeping earlier each month...call for more info.

ADDRESS -	Utah Packet Radio Association
For all UPRA	4382 Cherryview Drive
business:	West Valley City, Utah 84120
	(801) 967-5896

19.2K or 38.4 KILOBAUD ON THE TNC-2
Clint Turner, KA7OEI

After some experimentation, I have made the following "improvements" to my TNC2-A (rev. 2) and these modifications have yielded the following results:

- Reduced RFI on HF & VHF
- Faster data rates
- More accurate DAYTIME clock
- This message

Continued on next page



RMPRA > PACKET

A NEWSLETTER OF THE ROCKY MOUNTAIN PACKET RADIO ASSOCIATION

FROM THE ROCKIES:
Chris Kelly, WD5IBS
President, RMPRA

This month's Packet Radio Magazine begins the regular participation of the Rocky Mountain Packet Radio Association (RMPRA) monthly column. The RMPRA was formed in Colorado in 1984, and has grown to include over 150 members throughout New Mexico, Colorado and Wyoming, and recently West Texas.

Our membership is spread over about 250,000 square miles, and so we have a great challenge to serve all these packeteers with a single organization. For this reason, the RMPRA has taken several new directions this winter, aimed at connecting our many remote areas, and promoting development of local packet groups.

RMPRA is an "umbrella" organization, composed of many local cells of activity, but serving a wide area with information and coordination of packet planning and operation. To keep all our members in touch with both the regional and national issues of packet radio, we use both a regional quarterly newsletter, the RMPRA>PACKET, and PRM as a monthly publication sent to each of our members.

Packet radio depends on agreement and cooperation on subjects like protocols and other technical

guidelines, bulletin board operation, digipeater linking, and higher level link design and far-reaching issues, and provides other "overhead" functions like newsletters. This frees the local groups, formal or informal, to pursue specific developments in their own areas, such as building a digipeater for a certain mountain, or putting a bulletin board on the air.

Through this column, we hope to inform the rest of the country of events and plans in the Rocky Mountain Region, and to establish the necessary links with other packeteers of various interests. These links will help all of us in setting directions on nationwide issues such as NTS packet traffic, HF packet connections, satellite packet use, and eventually, VHF/UHF terrestrial nationwide networks.

I want to thank our newsletter editor, Sam Selders, WOJHX, who has agreed to serve as editor for submissions from RMPRA to Packet Radio Magazine. If you have news or articles of a nature suited to publication in this column, or for the RMPRA>PACKET newsletter, please send them to Sam.

We look forward to hearing from the rest of the country as their organizations and plans progress, and to a fruitful future for packet radio.

Continued from previous page

Note that some of these modifications (i.e. result #a above) are from other sources.

To reduce RFI I have noted that the use of bypass capacitors (0.01-0.1 uf) from each pin of the DIN connector to ground reduced the tendency of my TR7 to RESET my TNC when it was keyed up. Also, capacitors (about 0.1-0.47 uf) from pins 11 & 3 to ground and 0.01-0.04 uf to ground on U4 reduces "birdies". I have noticed far better results with disk-ceramic capacitors than with mica or mylar capacitors. The use of a shielded RS-232C cable, and having the cable from J2 (the DIN connector) wound several times through a large toroid as close to the TNC as possible also helps reduce RFI.

Also noticed was that the CMOS Z80A and other related components functioned flawlessly even after JMP2 was changed from its default of 2.4576 Mhz to a CPU clock rate of 4.9152 Mhz resulting in a DAYTIME clock accurate to within 1 sec/day (with CLKADJ at 0) and the TNC being able to handle faster data rates.

The accuracy of the DAYTIME clock at this point is mainly limited to the netting of the 4.9152 Mhz crystal which, when properly adjusted for accurate time anyway, should not harmonically interfere with 145.01 Mhz packet operation.

Now for the HIGH SPEED modifications. This will allow 19.2K baud operation of the TNC when all of the RADIO and/or TERMINAL baud rate select switches are opened.

a) connect pin 6 of U4a to pin 27 of U27 through a 2K ohm resistor.

b) sever ground foil of one of unused gate inputs of U9 or U7 (pin 1 of U7, for example) and connect pin 1 of U7 to pin 6 of U4a, and connect pin 2 of U7 to pin 11 of U10e through a 2K ohm resistor. Do NOT use U14 for this as it is battery-backed up!!! Doing so will shorten battery life. (If you wanted 38.4K baud operation, then use pin 5 of U4a instead of pin 6.)

I have noted NO deterioration in performance due to these mods.

Next month in PRM look for an article on an advanced technology environmental conditioning device to support the TAPR LSC-10 Packet Accessory. Complete technical data will be provided.

Also there will be an article on the first known packet radio mobile operation from a steam powered railroad train, software reviews, more local news, etc.

GRAPES From The Grapevine

The Newsletter of the Georgia Radio Amateur Packet Enthusiasts Society

SOUTHNET REPORT

Eric Ellison, N4CI

PLEASE YOU SOUTHNET GUYS IN OTHER STATES, WRITE YOUR UPDATES FOR THE PRM. WE NEED TO KNOW WHAT IS GOING ON AND THE INFORMATION IS IMPORTANT!!!

The SOUTHNET Conference at the recent Orlando Ham-cation kinda got a bit lost in the shuffle of the hamfest and the ARRL Networking Conference. You can only do so much in one weekend. Thanks to Gwyn, W1BEL, for providing a room for SOUTHNET. The networking conference was the first that I have attended and I finally put faces to all those famous calls that I have been seeing on DR-NET. I hope we can announce another SOUTHNET meeting for this fall, perhaps in Alabama or Mississippi or South Carolina. With air fares the way they are, we may all be able to fly to the conference. How about Gulfport?

In spite of not meeting formally as the SOUTHNET Committee, the organization of the region will become more important as we come closer to a higher order networking solution. In the meantime, informal contacts made at Orlando by folks well represented by Georgia, South Carolina, and Florida did manage to update state activity. I hope other SOUTHNET Committee members will write reports for this column in months to come.

Georgia Update:

Georgia is perking along great on the interim networking plan announced at SOUTHNET II in November. The problem is time and money (so what else is new?) The RLI forwarding systems are working fine in the LANs that have been established. The problem on 145.01 seems to be solved for the moment as folks migrated rapidly to LANs off of the trunk frequency. The sites at Valdosta and Macon need some firming-up, but otherwise we have almost a 100% path. Thanks to Scott, KF4TT, and company in Gainesville, FL, we have the much needed site in Lake City, FL. Scott, the day is near when we will pump lotsa store and forward traffic thru you to all parts of Florida and back. Thanks for the hard work. For a few weeks when the path was reliable and solid, traffic went from Tennessee, South Carolina, and Georgia all the way to Orlando. Due to lesser packet activity in the Savannah and Augusta areas we do not have RLI coverage there. However, primary LANS have been established. Folks in those areas, if you read this, GRAPES may be able to help with a system in the near future when we solidify the 145.01 trunk. Macon is about 90% complete with their system, but do not have it installed. We have need of only about 2 or 3 more 145.01 digis in the state, and then we can begin to optimize the whold system. One needed digi is being installed on a 2000ft tower just north of Albany, and one is needed in the Milledgeville area to bring the Augusta guys into the net. A third may be needed in the Southeast portion of the state to accommodate Savannah when they come on line.

Georgia LAN Progress:

METRO-LAN (Atlanta) KF4JJ-1 145.03

On or before March 29th, the METRO LAN will probably be on stream on 145.03. This was called for in the Networking Plan but is not yet implemented. Dave, KA4IAR, John, KF4JJ, and I are working furiously to meet the deadline. The proposed site is at the 950 foot level on the WXIA transmitter tower in Decatur, GA. Thanks to KE4ZV for securing the site. Chris, KA4OVX, Dennis, WB4GQX, and I scoured the Orlando hamfest for parts, and we found everything needed. We should have an RLI system working by the time the digi is installed. We can install two more digis to accommodate this LAN and good locations would probably be LaGrange and Madison. This would give optimum coverage for the area designated in the networking agreement. WA4TXT-1, currently on 145.01 in Hampton, GA, may be put into Atlanta LAN service when WB4GQX-2 on 145.01 in Forsyth, GA is brought up in power. This should be welcome news for the folks in Griffin, GA.

ATLANTA LAN (Atlanta) KD4NC-1 145.13/73, BBS WA4VMV
There were apparently some problems with the Atlanta LAN digi for a few months, but Doug, KD4NC, seems to have the system working fine now.

SAPS LAN (Tifton) 145.13/73

Wayne, WD4LYV, reports that the guys in South Georgia are snug as a bug in a rug on 13/73. Larry, KF4JF, has transferred the RLI system formerly on HF to Wayne for that LAN's use. Wayne proposes that we use mnemonic callsigns for BBS and put the call of the SYSOP in the Beacon text or HID text for station ID purposes. This is similar to the Florida GATOR area code/airport identifier scheme, and has some very, very strong benefits. For example, Wayne's board would be SAP, the METRO LAN board would be MET, Atlanta LAN would use ATL, etc. Mnemonics are easier to learn for humans, and routing tables would be more consistent over a long period of time for automatic forwarding. We are not suggesting this system for the 145.01 trunk system where future routing menmonics will be used, but only for local BBS links. Let Wayne or me know what you think.

SOUTH GEORGIA LAN (Albany) 145.09

The Albany group is busy installing the SGL LAN on 145.09. This machine has been testing on 145.09 from the 2000 ft tower in North Albany (Parrot, GA).

MIDDLE GEORGIA LAN (Macon) K4ICT-1 145.03

Frank, K4ICT, has been very busy making a living, so there has been some delay getting a planned digi on 145.01 in the Cordelle, GA area. And the RLI system is about 90% complete, and not yet on the air. Sometimes earning a living gets in the way of having fun.

NORTH GEORGIA LAN 145.09 WB4GQX-3 & -4, AA4EO-1, BBS W4KAU

This was the first Simplex LAN to move off 145.01 and is serving 60 to 70 users very well. Dennis, WB4GQX, is experimenting with simulcasting to allow

* The Radio Amateur Telecommunications Society *
 ***** Information Bulletin *****
 ***** 12 March 1986 *****
 ***** LEVEL THREE NETWORKING IS HERE ! *****

The N2DSY-2 digipeater in Little Falls, New Jersey has been converted to an X.25 packet switch. The switch callsign is now "N2DSY-3". The switch is used by all users by simply typing:

C N2DSY-3 (ret).

The switch will then be connected to you. You respond by sending a carriage return. The switch will give you a banner. At this banner and prompt type the callsign of the desired station and an address. The format for this is given by the switch in the prompt and looks like:

W2PAT @03100201100 (ret).

What the switch will do is locally acknowledge your packets and send them on to the next hop. This is especially handy when the channel is crowded.

The old digipeater address of "N2DSY-2" still works and it will continue as long as is required.

This switch runs software written for the TNC-2 family by Howie, N2WX.

In this early version there are five links supported, each with up to five VIRTUAL CIRCUITS.

The code is the first release and should be considered as a beta-version. Please report any problems to:

The Radio Amateur Telecommunications Society
 206 North Vivyen Street
 Bergenfield, NJ 07621

They will be analyzed and forwarded in summary form to Howie.

Thanks for your help during this exciting time !

 Continued from previous page

real time connects from .01 to .09 on WB4GQX-4. This crude dual port digipeater works well, especially for those stations that must use one of the high site trunk digipeaters. These LAN members understand the MailBox and forwarding operations well and confirm the greater ease of education in a smaller LAN.

EAST GEORGIA LAN (Augusta) 144.99 No Report.
 WEST GEORGIA LAN (Columbus) 145.07 No Report.
 SOUTHEAST GEORGIA LAN (Savannah) 145.07 No Rpt.

Well, that's it for now. The interim GA network using "WORLI NNCs" is working splendidly, and except for a few jokers that put high volume servers on 145.01 briefly, everyone seems to be complying with the networking plan. 145.01 is reserved for digi DXing and other human fun from 5 PM to 1 AM and 6 AM to 9 AM daily. The BBSs are forwarding traffic at other times.

NOW THAT WE HAVE LEVELS 3 AND 4 LETS MOVE ON
 Phil R. Karn, KA9Q

My TCP, as a "layer 4" protocol, is up and running. It implements the full-blown ARPA TCP spec as described in RFC-793 and MIL-STD-1778 with two exceptions: security (which I assume we have no use for) and urgent data (which I can't figure out how to use, although it wouldn't be hard to add). Other than that, there was no reason to change the spec to suit our needs, with the result that my implementation is fully compatible (and has been tested with) the various other implementations out on the Internet. I hereby toss it out on the table for consideration as our end-to-end Transport protocol. There is no reason to "roll our own", thus adding to the layer 4-5-6-7 confusion. I've reworked the programming interface to make the facility more general; there are now optional "upcalls" (also known as "pseudo interrupts" for transmit buffer availability and connection state change as well as receive data availability.

The ARPA Internet has no need for a distinct session layer (level 5); its few functions are assumed by the "well known port" concept in TCP (and UDP). As for presentation layers, this depends on the application. Since remote login is likely to be an important initial application, I'd like to suggest that we consider the ARPA TELNET protocol. This is a simple, extensible technique where various options (e.g., which end of a connection is to perform character echoing) can be negotiated. For example, a user connecting into a UNIX system (which conventionally operates in "full duplex" mode with per-character transmissions and remote echoing, to allow use of fancy command line and screen text editors) will receive a WILL ECHO offer from the host. Your Telnet, which is under your control, can respond with either a DO ECHO or a DON'T ECHO command, which either accepts or rejects the remote host's offer. Many other options exist, including ones to control the faucets on the kitchen sink, but only a small set (about 5) are actually recommended for use and only one or two (echo being the most important) are actually used widely. The mechanism is there, however, for other options to be implemented, and their use can be negotiated with other systems as needed.

Other presentation level protocols of interest include the FTP (File Transfer Protocol) and the SMTP (Simple Mail Transfer Protocol) with self-evident uses. SMTP really is simple to implement, as there are only about 5 commands. FTP is quite a bit more complicated, since it is one of the oldest commands in the ARPANET (long predating TCP/IP and about as old as TELNET), and although it is widespread there may be simpler alternatives. I would like people to look at SMTP, however, since it represents a much "cleaner" way to transfer mail messages than the current highly ad-hoc of linked WORLI bulletin boards. I can provide documents on these protocols, along with sample sessions, if there is interest.

Algorithm

Lynn W. Taylor, WB6UUT

Yea, from the table of my memory

I'll wipe away all trivial fond records.

-- Hamlet (Act I, Scene 5, line 98)

According to the ISO Open Systems Interconnect model, the network controllers are responsible for the first three of the seven protocol layers in a packet switched network. Layer 1, the Physical level, is responsible for the physical aspects of communication (radios, modems, HDLC, baud rates). Layer 2, the Data Link level, is responsible for taking the physical medium and making it error-free, and dividing it up among the users. The third layer, called the Network, or Communications Subnet level determines the host-subnet interface and how packets are routed in the subnet. Levels 4 through 7 deal with issues that are beyond the scope of this paper.

Routing is one of the key issues when defining a Communications Subnet Level protocol. The various routing algorithms can be divided into two categories, centralized (where some central station must know or discover the network topology, and serve as a clearinghouse for routing) and decentralized (where each TNC can handle at least part of the routing task). Centralized algorithms must be designed to recover when the master station crashes, and each station must know how to reach the router itself. Decentralized algorithms require each station to know how to pass traffic to other stations in the net; to accomplish this, the TNC needs to find out something about the network topology.

I am going to discuss two specific routing algorithms, the advantages and drawbacks of each, and why I believe we should select a decentralized algorithm for Amateur use. None of this material is original, and most is discussed at some length in the computer science literature. Some of the combinations of this information are new, particularly as they relate to the specific problems of Amateur usage.

The first algorithm has a couple of advantages, and one major disadvantage. This algorithm does not require any special knowledge of the network topology, other than a list of stations that the TNC can hear. When the TNC receives a packet addressed to someone other than itself, it simply passes it on to everyone it can hear except the station it received it from. The algorithm is appropriately called Flooding.

Flooding is easy to understand, and easy to implement. The problem comes when the load on the network increases. Since each packet will pass through every single node in the network, and many of them more than once, the amount of traffic generated by simply saying "Hi" can be staggering. Also, steps must be taken to prevent packets from looping forever through the network. The simplest case of this is a 4 station net (A, B, C and D) where all 4 stations can hear each other. If A originates a packet for D, it passes it to all 3 stations it can hear. B

passes it to both C and D, where D accepts it, and C passes it to A and D. D has already got the packet and ignores the duplicate, while A passes it to B and D. Again, D discards it, and B passes it around. At the same time, packets are flowing in the opposite direction around the same loop. While this simple case could be easily fixed, it becomes more complex in a larger net. One solution is to limit the life of any given packet to a certain number of hops, but this still generates a lot of unnecessary traffic.

A better algorithm would require each TNC to have a table giving the address of each node in the network, some measure of the distance to that station, and the address of the next station along a path to that station. A hypothetical 5 station net, and each node's tables is shown below:

A	←---	B	←---	C	←---	D	←---	E
B 1 B		A 1 A		A 2 B		A 3 C		A 4 D
C 2 B		C 1 C		B 1 B		B 2 C		B 3 D
D 3 B		D 2 C		D 1 D		C 1 C		C 2 D
E 4 B		E 3 C		E 2 D		E 1 E		D 1 D

In this example, the available communications paths are shown by arrows (i.e. A cannot communicate directly with C). Note that each station knows how far away all the other stations are, and who is the next station in the chain. If A wants to talk to D, A knows to pass traffic to D, and it will take 3 hops to get there. It is up to B to know who to pass these packets on to.

The problem with this method is easy to see -- where do these tables come from? In the proposed WestNet protocol, which defines a long-haul network for linking geographically separated LANs, a similar algorithm is used which assumes all nodes internal to the network will stay on. In other words, this network is static (because all the nodes are dedicated devices to be installed on mountaintops). In a local network, stations (nodes) tend to appear and disappear frequently.

In a dynamic network, the answer to the question must be "from the network itself." This further divides into two problems: how does a new station get its initial table, and how do we make sure the table each node has is up to date. To clarify this problem, lets add station F to our earlier network:

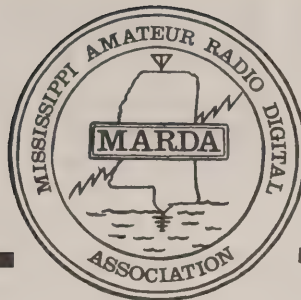
$$\begin{array}{ccccccc} A & \longleftrightarrow & B & \longleftrightarrow & C & \longleftrightarrow & D & \longleftrightarrow & E \\ & & \hat{A} & & & & & & \hat{E} \\ & & | & & & & & & | \\ & & \text{-----} & \longrightarrow & F & \longleftarrow & \text{-----} & & \end{array}$$

In this example, A should now pass traffic for E through F, while traffic for D can follow its previous route, or as efficiently through E and F. If all stations listen for new stations on the air, and F comes on and sends an "I'm here" (or CQ) packet, A and E can detect F's presence, connect with F to make sure they can communicate, and pass copies of their routing tables. By taking the best information from both tables, F can build its initial table:

Continued on page 18

MARDA

The Official Newsletter of the



MONITOR

Mississippi Amateur Radio Digital Assn

Patrick J. Fagan WA5DVV
2412 E. Birch Dr., Gulfport, MS 39503
Compuserve ID: 74246,1310

BBS/TECH LIBRARY:

Now that Hank, WORLI has released his last PBBS update with version 11.2, it makes one think about what project he is planning next. I am running 10.0 here but understand the most recent offering is a work of art.

Here in Mississippi the BBS network is still in its fledgling stages. It was just recently that I had the opportunity to forward MAIL to another BBS (WB4RHO) automatically. Glynn in Headland, AL got his WORLI system up and running and requested that I add his BBS to my forwarding list. Forwarding list? I didn't have one so....it was off to the SYSOP manual where I undertook a crash course in how to set up routing tables.

To the older BBS operators who have been forwarding mail back and forth, this is no big deal...but...to see the system work for the first time is a real treat. Right now WA5DVV forwards mail at 13 minutes past each hour. The only WORLI BBS in reach is about 200 miles east of Gulfport. Even through multiple DIGI's, reliability is not the best.

The MAIL forwarding system within the state is very limited. Alan, WD5IKD, in Pearl (near Jackson) has a BBS on a CoCo but it doesn't have forwarding capability at this time. Bill, WB5SXX, in Vicksburg is running a BBS on a Model 1 and the same story holds true in his neck of the woods. Both of these SYSOPs hope to get a compatible system on the air in the future.

During a recent EYEBALL QSO with Fred, KE5SJ, an interesting idea emerged. The WA5DVV PBBS is constantly running out of disk space. Even with three drives I still have to purge old files at least once per week. Hopefully someone will find a way to install a hard drive on an 820 to relieve this problem. In the interim let us ponder this thought.

Over the past few months PACKET RADIO has grown by leaps and bounds, with technology changing faster than ever. The SYSOPS try to keep the DataBase areas of their BBSs stocked with info on these discoveries. The new PACKETEERS can't get enough of this when first coming on board. It is a shame that a lot of the great ideas get removed from the BOARDS before everybody has a chance to read them. Since disk space is the limiting factor on how many files can be on line at a time, a directory could be

written that lists all files available in the LAN. Because so many different computers are being used on packet, this data could be spread around to those stations that would maintain the machine specific programs. Others that have large 30 Meg hard drives could store the older copies of GateWay, etc. The most recent issues still would be found in the DataBase area of the local BBS, whereas the archive copies and older files would be located elsewhere in the LAN. Think of it as a Main technical library and its branches. We will be trying this system out in the Gulf Coast LAN to see if it is feasible. More on that plan after it has been implemented.

MARDA MEETING:

The 1986 Capitol City HamFest and Mississippi State ARRL Convention will be held in Jackson on April 19 and 20. MARDA will have a table with an operating (don't tell Murphy) Packet Demo on display. At 2:00 PM on Saturday, April 19th, there will be a combined VHF/Oscar/AMSAT/Packet forum. I will be looking forward to meeting everyone there.

MODEL 100 MAILBOX:

Here is an interesting little idea for Model 100 users. If you have been thinking of setting up a portable packet station, have I got a deal for you. Now you can take this setup one step further by installing your very own PPPMS (Portable Packet Personal MailBox System). This little program was written by J. R. Hanna. Currently, version 1.1 has been modified by Karl Geng, N1DL to run on TAPR TNC2s and work-a-likes as well as the Kantronics series of TNCs. DOC and uploading was made possible by Dick Roux, N1AED. It allows the connecting station to leave a message for you, page the SYSOP for a chat and then disconnect. When you return, a file of messages with time/date info (provided CON-STAMP was ON) has been left on the Model 100. The program is in Basic so it can be customized very easily to say anything you wish in the connect message. Look for it on Compuserve's HamNet in Data Library 9. The DOC, TNC2/2A/200/PK80 and Kantronics versions of the program are all in one file called AUTOSY.100. Once downloaded, all you have to do is edit the portion of the listing you need for your TNC, load the programs into your M100 and connect away. Oh, incidentally, it has a terminal mode built in so you can go on line for a live QSO with one keystroke. A lot of the stations in the area are using this program and have found it to be a neat addition to their packet operating enjoyment. Try it - You'll like it. [look for it in the April PRM. ed]

Until next month, may all your CONNECTS be many and RETRIES few.

Continued

A 1 A
B 2 A
C 3 E
D 2 E
E 1 E

There are two equally good paths from F to C (through E and D, and through A and B), F selects these at random.

Also, the rest of the net need to be told about the new network topology. First, A (and simultaneously, E) tells everyone it can hear that F is one hop away from it. B checks its routing tables, decides that this is good news, and passes the news along to everyone it can hear, etc. This is the flooding algorithm again, with a twist; stations only pass on good news, so if a station already has a path of length N, it only passes on news of a path of N-1. In other words, when B announces to A and C that "I'm 2 hops from F", C is glad to hear, while A could care less, since A is only 1 from F, while C didn't even know F existed. C will wind picking the first path to F it hears about, since it has 2 paths of length 3 to F. This also means that C might use a different path to F than F would use to C; this does not matter since each have the same length.

F would also pass on the news of its complete routing table, since the whole table is news to it. This way, A learns of the new path through F to E and E learns about its new paths. The new tables would look like this:

B 1 B	A 1 A	A 2 B	A 3 A	A 2 F
C 2 B	C 1 C	B 1 B	B 2 C	B 3 D
D 3 B	D 2 C	D 1 D	C 1 C	C 2 D
E 2 F	E 3 C	E 2 D	E 1 E	D 1 D
F 1 F	F 2 A	F 3 A	F 2 E	F 1 F

A <---> B <---> C <---> D <---> E
^ ^
| |
-----> F <-----

A 1 A
B 2 A
C 3 E
D 2 E
E 1 E

Adding a node to the network is easy compared to what happens when a node leaves the net. Having a node tell the net its leaving is impractical, because that node may not be able to tell the net because of hardware failures, power failures, or propagation changes. One solution would be for a node to report to the rest of the net that node X is unreachable whenever it can't pass traffic on to X. This bad news would be passed through the net until it reaches X, which would then tell those stations it can still reach that it is indeed still reachable, generating a new set of entries in the network tables.

As an example, A is passing traffic for E through F when F goes off the air. A, realizing that it can't pass traffic through F announces to B that E is unreachable. B passes this news to C, who passes on to D, and eventually to E. At this point, E has been erased from everyone's routing tables. E would then tell D "I'm still accessible", D reports to C that "E is still 1 hop from me", and the good news passes through the net (and contradicts any bad news still circulating). A may now use the longer path through B, C and D, and the network has recovered from the loss of the path to E through F.

The problem of updating the routing tables is the most serious drawback of this algorithm, and I am not suggesting that the method I have explained above is the best. In Computer Networks by Andrew Tannenbaum, he points out that "good news travels fast" while bad news may take awhile to propagate through the network, especially where looped paths exist. By completely eliminating a station from the network tables and re-inserting it, many of these kinds of problems may be avoided.

I have explained two decentralized routing algorithms. These algorithms allow the nodes themselves, on an equal basis, to decide how to route data in the net, and dynamically alter the routing when the network composition changes. What are the problems involved in a centralized algorithm?

Centralized algorithms require a single station to have complete knowledge of the network. To do this, the master station must probe the network, and pass on its discoveries to the rest of the net. The master must either be a unique station type, or, in a homogeneous network, a station must be selected to be the master. A new station, when it comes on the air, must be able to tell the master it is on, and, if it can't reach a master, would most likely become one. Problems exist, in the case of two networks "growing" together (more than one master), and when the master fails. Depending on the implementation, a network may continue to operate without the master based on old information the master distributed, or collapse when the master disappears. Either solution would be undesirable.

I have shown that a properly designed decentralized system will not suffer unduly from the loss of any single critical station, and recover from the loss of any node in a reasonable manner. Centralized systems rely on the master station discovering the complete network topology, finding changes due to propagation, etc. and distributing this info. Since Amateur packet nets are very dynamic, it is probable that the master will be lost, causing the net to crash, or continue on without any direction.

While I feel the decentralized approach is best, the possibility of reasonable mechanisms for operating centralized networks, hybrid networks, rings, token passing schemes, and other are all worth investigating. My main purpose is to serve as a catalyst for further discussion.

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PACKET RADIO MAGAZINE Subscription Form

I want to join the Florida Amateur Digital Communications Association and receive PACKET RADIO MAGAZINE each month. I understand I will be billed for a one-year membership beginning the month this card is received by FADCA. Membership dues (US Dollars): United States = \$15.00, Canada = \$18.00, Foreign (airmail) = \$25.00.

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PACKET RADIO MAGAZINE

The Florida Amateur Digital Communications Association
812 Childers Loop
Brandon, FL 33511

The TAPR TNC-2 prize in the FADCA membership contest was awarded to the Boca Raton IBM Radio Club. The Boca club was nice enough to defray a portion of the cost of the prize TNC, thus limiting the shock to the FADCA treasury. There were only five participants in the contest. Ted Huf, K4NTA, enrolled the greatest number of new members, but was well below the number required for the award of the prize. A total of (only) 25 new members joined as a result of the contest, so do not look for a repeat next year.

The FADCA Software Library

A new item in the FADCA Software Library is a nice terminal program for the TRS-80 Model 3 and 4 computers called PACK-E-TERM 2.0 by Chuck Harrington, WA4GPF. It has some nice features including triple split screen. It works great with a TAPR TNC-1 according to the author.

Other new entries in the library include the Wake Digital Communications Group Packet Terminal Program, Version 2.03 with XPACKET binary transfer protocol for the IBM PC family, and the WA7MBL MailBox code for that same computer which is compatible with the WORLI system.

Please be sure to include a diskette or two, a return mailer, and return postage when you request software. A dollar or two to defray expenses would also be appreciated.

FADCA Software Exchange
% Howard Fisher, N4APU
3191 Willow Road
Wimauma, FL 33598

Model 100 Terminal Program for the GLB PK1.
Continued

```
270 IF A$=CHR$(24) THEN B$="":PRINT:GOTO 210:' CTRL-
    X CANCEL BUFFER
280 IF A$=CHR$(8) THEN PRINT CHR$(32);CHR$(8);:'
    BACKSPACE CLEANUP
290 B$=B$+A$:GOTO 210
300 ' TRANSMIT IT
310 PRINT#1,B$;B$=""
320 FOR I=1 TO 100 : NEXT:' COOL IT A MOMENT
330 PRINT#1,CHR$(10);:PRINT:RETURN
400 ' RS-232 PORT INPUT
410 C$=INPUT$(1,2)
420 IF C$=CHR$(13) THEN C$=C$+CHR$(13):' MORE SCREEN
    HOUSEKEEPING
430 PRINT C$;
440 RETURN
500 PRINT#1,CHR$(13);:GOSUB 600:' GLB INITIALIZE
    BAUD, ETC.
510 PRINT#1,"S";:GOSUB 600:' DISABLE ECHO
520 PRINT#1,"E";:GOSUB 600
530 PRINT#1,"D";:GOSUB 600
540 PRINT#1,"SC";:GOSUB 600
550 PRINT#1,"K5JB ";:GOSUB 600:GOSUB 600:' CHANGE TO
    SUIT...NOTE SPACE
560 PRINT#1,"1 ";:GOSUB 600:' SSID...NOTE SPACE
570 PRINT"(ENTER DESTINATION CALL)": ' A REMINDER
580 RETURN
600 FOR I=1 TO 400:NEXT:RETURN:' TIME DELAY
700 PRINT"DISC":PRINT#1,CHR$(3):RETURN:' SENT HERE
    BY FUNC. KEY 8
800 ' DISPLAY COMMANDS - FUNCTION KEY 7
820 PRINT TAB(9);"GLB PK1 PACKET TERMINAL
830 PRINT TAB(4);"F-1: ENTER EDIT, F-2: XMIT
840 PRINT TAB(1);"CTRL-X: SCRUB ENTRY CTRL-D;
    REDISPLAY
850 PRINT TAB(4);"ESC: EXIT EDIT ESC-ESC: COMMAND
860 PRINT TAB(4);"F-7: DISP COMMANDS F-8:
    DISC":PRINT
870 RETURN
```

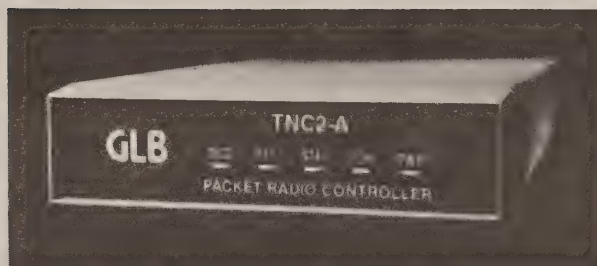
GLB TNC2A PACKET CONTROLLER

GLB Electronics - the first commercial producer of packet controllers joins the "TAPR Revolution" to bring you the GLB Model TNC2A Kit. This kit is the latest TAPR design and is supplied with top quality components. The GLB TNC2A is backed by over 14 years of experience in amateur radio kit products and our technical staff is available to assist you daily from 1 to 3 PM Eastern time.

GLB Model TNC-2A Kit

FEATURES

- AX.25 Version 2.0 Software
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- Multiple connects - up to 10 stations
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- Standard DB25 for RS232 connection
- Simple radio hookup
- Radio modem w/built-in counter for calibration
- Low power CMOS option
- Tuning indicator socket for HF & satellite work
- Modem disconnect for future options
- Lithium battery backup for RAM



Hardware
Software
Documentation

} by TAPR

SPECIFICATIONS

- CPU** - Z80A microprocessor
Clock - 2.4576 Mhz standard, 4.9152 Mhz available
Memory - 32K EPROM, 16K RAM standard
HDLC - Packets are controlled by hardware for maximum performance permitting full duplex operation
Modem - 1200 baud, Bell 202 compatible (standard) easily configured for 300 baud/200 Hz shift for HF use
Serial - Computer/Terminal port is industry standard RS-232-C compatible for use with most equipment
Radio - Watchdog timer for channel protection transmits audio levels adjustable for nearly any radio. Wide dynamic range demodulator. Channel busy input (RF-DCD) to inhibit packet transmissions on a shared channel.
LEDs - Power - tells you when power is applied
Status - tells you when you have unacknowledged traffic in your buffers
Connect - tells you when you are in the error-free mode
DCD - tells you when your TNC2A senses other activity on the channel
PTT - tells you when your TNC2A keys the transmitter
Power - +10 to +15 VDC CMOS-110 ma NMOS-260 ma Typical

Model TNC2A Kit NMOS	\$154.95
Model TNC2A Kit CMOS	\$169.95

Quantity discount schedule:

1-2 pcs - net
3-4 pcs - 7%
5-9 pcs - 10%
10-19 pcs - 15%
20 & up - 20%

Shipping weight - 5 lbs.

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PAKRATT™ Model PK-64

shown with enhanced
HFM-64 option installed



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FIRST FIVE MODE DATA CONTROLLER

The Pakratt model PK-64 by AEA is the world's first computer interface that offers Morse, Baudot, ASCII, AMTOR and Packet all in one box (hardware and software included) at a price many competitors charge for Packet alone (from \$219.95 Amateur net). Do not let the low price fool you; coming from any other company but AEA it WOULD be too good to be true. The PK-64 works with virtually any voice transceiver. The Pakratt is the easiest of any to hook up and have operating in just a few minutes.

In Packet mode, the PK-64 offers virtually all the features of every other Packet controller on the market, plus many important features left out by others due to cost constraints. For example, we have included a hardware HDLC, true Data Carrier Detect (DCD), multiple connect with up to ten stations simultaneously and full implementation of version 2.0 of the AX.25 protocol.

Because the PK-64 was designed specifically for the Commodore 64 (or C-128 and SX-64) computer, we have been able to do many things not economically feasible with general RS-232 interface controllers. For ex-

ample, the Pakratt includes true split screen operation with on-screen status indicators and an on-screen tuning indicator.

ENHANCED HFM-64 MODEM OPTION

The standard PK-64 will operate all modes with a phase-lock-loop (PLL) detector roughly equivalent to all popular packet modems in the marketplace (except we have included extra filtering). The enhanced HFM-64 modem option offers true independent dual channel filtering with A.M. detection (like the famous CP-100 Computer Patch™). The enhanced HFM-64 option also offers a hardware LED tuning indicator (like the CP-100) and a front panel variable threshold control for setting maximum sensitivity under various band conditions. We recommend the HFM-64 option for anyone keenly interested in weak-signal heavy-QRM HF operation. For anyone desiring to operate FM RTTY with the standard North American tone pair or CW receive, the HFM-64 is required. The HFM-64 is field installable with no soldering or test equipment required.

WORKS WITH THE POPULAR C-64 COMPUTER

AEA designed the PK-64 around the

low-cost C-64 because of the special architecture features making it especially suited to Amateur Radio applications. The C-64 should not be viewed as a mainframe, but rather a very economical accessory to your data communications system. Many owners of expensive computers such as IBM, TANDY, APPLE, KAYPRO, ATARI, etc., are now buying the low cost C-64 and dedicating it to their operating position. They simply cannot find software for their machine that even approaches the power and user friendliness of the PK-64. Plus, think of the convenience of having only one controller and keyboard to go from one mode to another without having to re-do cabling!

The PK-64 is so complete that all you need to do is wire up a microphone connector to the end of a cable (provided) and you are ready to go. There is no need to track down special terminal software, cabling or even a power supply. It all comes with the PK-64. So do not be the last on your block to own the most exciting new product in years. See the PK-64 at your favorite dealer or write for our specification sheet now.

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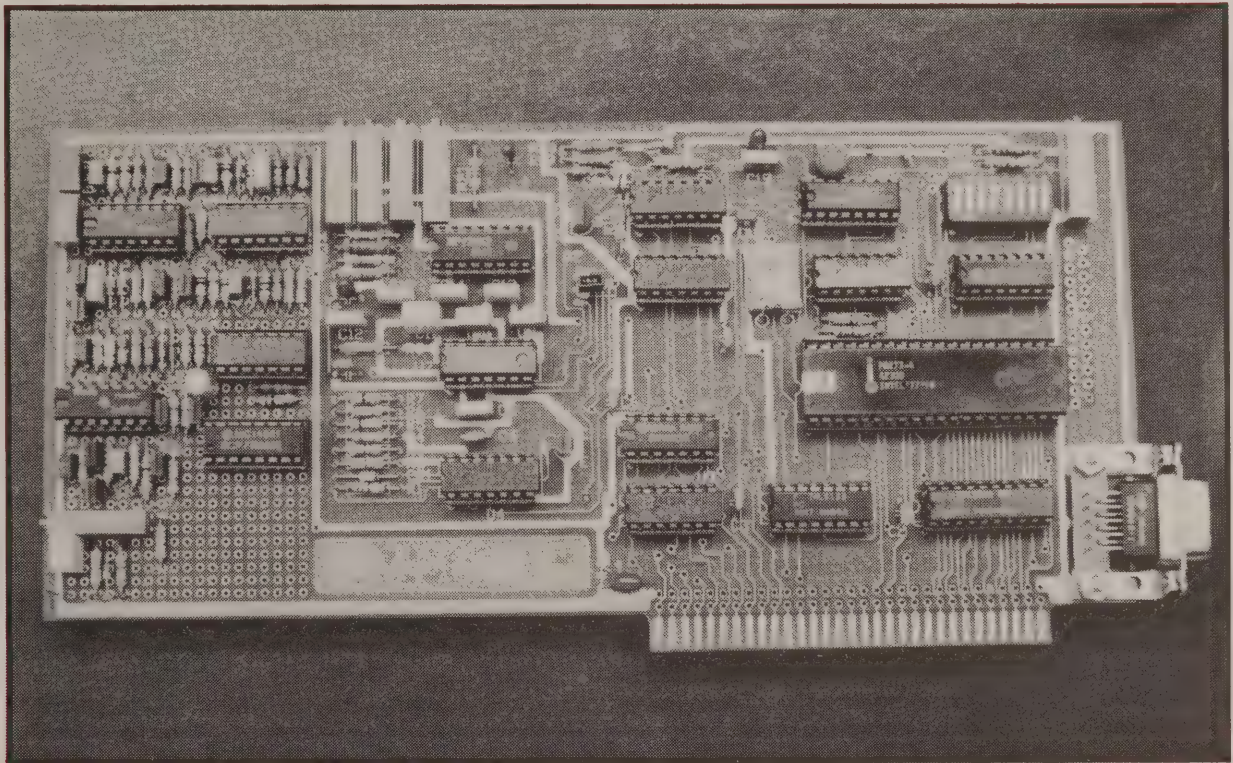
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August 1986

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PACKET RADIO MAGAZINE

Dedicated to the Advancement of Packet Radio



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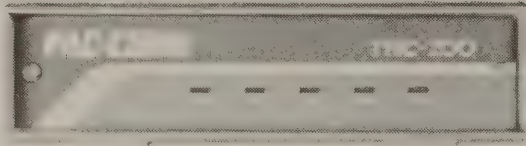
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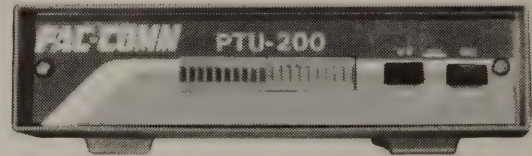
TNC-200



- World-standard TAPR hardware design
- Internal modem operates at 1200 or 300 baud
- Active filter improves modem sensitivity
- Five labeled LED status indicators
- Terminal baud rates 300,1200,2400,4800,9600
- Works with any RS-232 terminal or computer
- Battery backup for 16K RAM memory
- CMOS draws only 135ma (typ), NMOS 250ma (typ)
- World-standard TAPR software command set
- AX.25 Version 2 protocol fully implemented
- Up to 10 simultaneous connections
- Supports Level 3 networks (in development)

	<u>CMOS</u>	<u>NMOS</u>
Assembled and Tested	\$219.95	\$199.95
Full Kit with cabinet	\$169.95	\$154.95
Kit without cabinet	\$144.95	\$129.95
Hard-to-find Parts	\$ 84.95	\$ 79.95
PC Board and Assy Manl		\$ 39.95
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PACKET RADIO MAGAZINE

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Articles and photographs are solicited dealing with any aspect of digital communications. Both technical and operational topics are desired including new product announcements and equipment reviews.

=====

OUR COVER. The Hamilton Area Packet Network group's HAPN-1 TNC card with an experimental 4800 baud modem in the wirewrap area. See the bulletins updating HAPN activities in this issue of PRM.

NETWORK USE OF SIX METERS UNDER CONSIDERATION BY FCC

Brad Voss, KE8CW

The FCC is considering a proposal to permit digital network use of the 52-54 MHz portion of 6 meters, used by some amateurs.

The proposal, written by Donald Stoner, a computer user and amateur radio operator is scheduled for a preliminary ruling in November. According to the proposal, the digital network would give personal computer users an alternative to increasingly expensive phone networks. The proposal would establish a packet-switching public digital radio service (PDRS), which would operate on 6 meters. Voice transmissions would not be allowed in the same segment occupied by the PDRS.

This proposal is being watched closely by both amateurs and computer buffs alike. Computer users are excited about the proposal since the key advantage is that a radio based network would be less expensive to use because there would be no connect or phone charges. Equipment costs would also be comparatively cheaper and affordable not to mention ease of use.

The network would work similarly to our present packet operating protocol. Information to be sent to another computer would be placed in a packet which includes a destination address. Each user is considered to be a node in the PDRS and would constantly monitor packets, looking for packets addressed to them. If a message addressed to the node is detected it is saved in the recipient's mailbox. The passing of messages through multiple nodes to get to its final destination is again similar to the work currently being done in amateur packet networks.

The ARRL has sent comment to the FCC and has said that the 2 MHz Stoner wants is too much for operators to give up, and that a smaller bandwidth of several kilohertz would be sufficient for digital shortwave transmissions. Stoner has commented that the system would be quickly overwhelmed if given such a small bandwidth.

Unfortunately, this proposal may only be the tip of a growing iceberg. Its no secret that commercial pressure on our amateur bands has been increasing and will continue to do so. The main issue of the proposal is that the upper portion of 6 meters is under-utilized and could be put to better use. The success of this proposal will most likely be determined on the definition of under-use.

The FCC decides whether to issue a formal rule for public comment in November. Watch for further details in your favorite ham magazine or computer magazine; the proposal is being watched by many different interests.

-PRM-

CACTUS CORNER

Lyle Johnson, WA7GXD

This month we present an NNC update, a few additional thoughts on the KPC 2400 and more information on HF operations.

NNC

The first Alpha NNC was delivered in late June to KE7CZ followed the next week by shipments to most of the other "Alpha" software developers.

The first units are experimental in nature. No "real" software has been written for them, and the hardware, while suspected of working well, hasn't proven it yet! The modem boards were not included in the first shipments; there were layout problems and they will be following soon.

The NNC has been called "The silliest thing I ever heard of" by one packeteer; others keep asking when they can get one.

While most of you probably already know what the NNC is for, bear with me while I introduce it to any newcomers that may be reading this column.

The Network Node Controller is a sort of super TNC. It has up to four radio ports (compared to 1 for a standard TNC) and two serial user ports. It also supports parallel interfaces (Centronics compatible printer port and the Small Computer Systems Interface, or SCSI, bus). It includes 64k to 256k bytes of battery-backed RAM and 32k bytes to 256k bytes of other EPROM and/or RAM memory. It uses an HD64180 processor for Z80 compatibility. It is small, rugged and made almost entirely out of CMOS parts. It can be fastened to the side of a standard 5-1/4" floppy disk drive, and an optional floppy controller board turns it into a high-performance stand-alone development system for software.

By using a Z80-compatible processor, the wide range of Z80 development tools (languages like C, debuggers, etc.) and text editors (like WordStar) become available for it. In addition, software developed for the Xerox 820 may be easily converted to run on the NNC.

So why make another Z80 system when Xerox boards are around for \$50?

The Xerox 820 is designed for an office, has lots of parts and limited memory. The NNC is much smaller, uses far less power, should be more tolerant of noise, easier to clean up for remote sites and should be much more reliable -- as well as much faster in operation.

Why not use an 8088?

The HD64180 represents similar processing power to the 8088, but at a higher level of integration. This means fewer parts, smaller boards, reduced cost and better reliability.

Why not use a Taiwanese PClone motherboard?

For the same reasons that the Xerox 820 board is not recommended for remote use. Power drain, complexity and in the case of the PClones, card edge connectors.

Remember, the NNC is not intended to be your shack computer; it is intended to sit on mountaintops (in the West), Farmer John's corn silo (Midwest), TV channel X's tower (East) or ??? You get the idea.

Hopefully, there will be some serious packet application software (networking, including AX.25 Level Three switches and datagram TCP/IP switches) running on the NNCs in a few months and Beta test can begin.

Stay tuned!

2400 BIT PER SECOND PACKETING

The Kantronics KPC2400 hasn't yet arrived at TAPR (our KPC1 was traded up, and the new unit is expected "any day now").

However, the discussion last month left some folks with a somewhat negative impression of the unit and I want to clarify things a bit (clarify is defined as "muddy the waters further").

The example given last month assumed keyboard QSOing on a lightly loaded channel. I concluded that a 2400 baud modem with today's radios would net you about 33% more throughput.

On a heavily loaded channel, that number might go down. On a lightly loaded channel, it would probably go up several percent.

Let's look at another possibility.

Suppose we want to do a file transfer to another station that is in direct connect range with very good signals. Assume retries are nil and we are using typical radios. Using the numbers from last month for radios and delay time, but setting MAXFRAME to 7, PACLEN to 128 and DWAIT to 0, we would see something like this.

	1200 bps	2400 bps
DWAIT	mSec 0	0
TXD	mSec 300	300
PACKET	mSec 6100	3050
deadtime	mSec 200-500	200-500
DWAIT	mSec 0	0
TXD	mSec 300	300
ACK	mSec 130	65
Total	7030-7330	3915-4215

In this case, the 2400 bps unit is 1.7 to 1.8 times as fast as the standard 1200 bps operation. This is very close to the theoretical maximum of 100% improvement.

In summary, then, the 2400 baud modem may provide

as much as 80% improvement in throughput in certain circumstances and probably somewhere between 20% and 40% under more typical circumstances.

As with any benchmark, all of this should be taken with a large grain of salt.

HF OPERATIONS

Some recent inquiries via the TAPR mailbox have expressed confusion about HF packet operating frequencies. Allow me to take this opportunity to help clear up (cause ?) some misunderstanding.

First off, if you are used to RTTY conventions, forget them! Packet is a different method of communication. Mark and/or space frequencies aren't particularly meaningful since packet presently uses NRZI (non return to zero - inverting) encoding as opposed to RTTY's use of NRZ (non return to zero) encoding. Thus, while mark and space frequencies have meaning for RTTY (and other NRZ encoding schemes), packet only concerns itself with transitions between frequencies.

Suppose you hear that HF packet operation is on 14.105 MHz. What does 14.105 MHz mean?

It isn't the mark or space frequency, it is the suppressed carrier frequency of your LSB transmitter ASSUMING YOU ARE USING TAPR STANDARD TONES FOR YOUR MODEM.

Accordingly, if I use a TAPR TNC 2 and a Kenwood TS430S in my HF packet operation, I simply set the Kenwood display to 14.105.00 MHz and, if my HF transceiver is properly calibrated (don't count on it unless you have verified it recently), I should be able to copy packet signals.

Alas, if I am using a Kantronics or Packeterm IPT or AEA PK 64, this won't cut it.

Why not?

The TAPR recommended modem tones for 200 Hz shift 300 baud operation are 1600 Hz and 1800 Hz. The "decision point" or average frequency is 1700 Hz. At 14.105.00, my signal is centered on 14.103.30 MHz.

If I am using a Kantronics TNC, 1070 Hz and 1270 Hz (Bell 103 originate) tones are used so its signals will be centered 1170 Hz below the dial setting, or at 14.103.83 MHz. This is 530 Hz higher than the TAPR unit and no communication is likely!

Hence, if you use a Kantronics TNC on HF, set your dial 530 Hz lower than the "normal" frequency.

The AEA PK-64 and PK-232 use a tone pair of 2110 Hz and 2310 Hz. This yields a center frequency of 2210 Hz and resulting in a signal centered at 14.102.79 Hz, or 510 Hz low. Like the Kantronics case, we won't communicate (and an AEA to Kantronics attempt will fare even worse, with an error of 1.04 kHz!).

If you use an AEA PK64 or PK232, you should set your dial 510 Hz above the "normal" frequency.

To summarize, then, the packet frequencies published for HF indicate the suppressed carrier frequency of an LSB transmitter being fed TAPR-standard audio tones. AEA PK64 and PK232 users should set their dial 510 Hz higher and Kantronics and Packeterm users should set their dials 530 Hz lower.

Here is a tabular example:

TAPR	AEA	Kantronics
14.105.00	14.105.51	14.104.47
7.093.00	7.093.51	7.092.47

Of course, the surest way is to preset your dial, then use a tuning indicator, like the TAPR tuning indicator kit for XR2211-based modems, or the built-in AEA tuning indicator for the PK64 and PK232. For AMD 7910 "World Chip" modems, an external device independent of the modem itself is necessary.

Happy Packeting!

- PRM -

MAIL

Date: 15-Aug-86 06:18 EDT
From: Mitch Wolfson / DJOQN [73167,3137]
Subj: Ontyme Proposal

I received the July PRM, and I appreciate you running the Ontyme proposal. I have till now had very low response, I think partly to do with the way I had hastily worded my original proposal. I meant to imply that anyone interested in participating in the project at all as a user, especially to take advantage of the free month, should contact me ASAP. Of course, I need SYSOPs as well, but I can't go ahead with this if I can't find any users.

I have delayed the project another month, so there is still some time. If I am unable to muster up some significant interest by the September time frame, I will drop the project entirely.

Thanks again. 73, Mitch Wolfson DJOQN

RETRIES

PRM would like to properly credit the authors of the article on page 8 of the July issue, entitled Packet Beeper for TNC-1 Clone. The design and article were by Jeff King, WB8WKA, and Ron Petra, WA8OOH. We regret that their names were not included along with the article.

The article on page 6 of the July issue, TNC-2 Dual Port Digipeater was not submitted to PRM as an article, but was derived from literature handed out by project personnel. A newer version of the design should be available by the time you read this and an article on the new board has been promised for an upcoming issue.

- PRM -

Chuck Harrington, WA4GPF

In last month's ST article, I gave a brief introduction to the ST's first packet terminal program, PACK-ET-TERM 3.0.; this month we will look a little closer at the program's features.

One of the nice things about an ST with a color monitor is that the user may select the colors that he wishes to display on the screen; this is easily done before executing PACK-ET-TERM. Would you like a black screen with text displayed in green and connect messages in red? Or how about a white screen with black text and connect messages displayed in brown? No problem; just use the Control Panel Desk Accessory to select the colors and background you prefer and save your preferences for future use. When you run PACK-ET-TERM, the program will use the colors you have selected.

PACK-ET-TERM features a triple split screen display, with the transmit and receive screens divided, and connect status and time displayed. The current status of the various buffers and other program features is also displayed on the screen, to remind the user of what the software is currently doing. Like other split screen programs, characters entered from the keyboard will appear in the transmit portion of the screen, and received text or messages from the TNC are printed to the receive screen. The remaining third of the split screen is the top line, where the Connect Messages and time of day are displayed. A typical connect message from a TNC-2 might appear as:

*** CONNECTED to WA4GPF via K4AHO at 12:05

As this message is printed to the top line, the ST's bell rings alerting the operator to the fact that a connection has taken place. A connection may also trigger other program features if desired. A "Print if connected" feature is a great way to save only your connects to a printer. When this feature is enabled, received text is sent to the printer only when you are connected! This is useful as a mailbox, or as a handy way to create a record of your packet connections. The "Connect Buffer" feature is similar, allowing a buffer to automatically open when you become connected, thus saving your connects to memory for later reading or storage to disk. A "Connect Message" feature will automatically send a message upon connection; even with a TNC-1; users of TNCs that already support connect messages will of course now have two different connect messages available.

PACK-ET-TERM provides time stamps for TNCs that do not support time stamping, so your connects may be further documented with the time stamping at the beginning of each line. Time stamps are great when you are monitoring packet channel activity. You may open a 196K byte Receive Buffer, where each line sent to the receive screen is saved with a time stamp; you can capture hours of packet activity this way! I often use feature at night when I am sleeping, allowing me to see in the morning, everything that came over 145.01 all night long!

PACK-ET-TERM 3.0 also has a new "CQ feature". A short message which is held in a special CQ Buffer will be sent after 1 to 9 minutes of channel inactivity. It differs from the beacon mode, in that your CQ message is sent to whatever your UNPROTO is set to. Example:

WA4GPF>CQ <>CQ Packet Radio <>connect Via ORL....K

New CQ messages may be quickly loaded from disk to reflect your current digi routing or other needs. The "AutoCQ" will stop as soon as someone connects with you (unlike the beacon) and resume after the disconnection occurs.

Well, thats about it for this month. I am writing this the day before leaving for the Jacksonville hamfest where hopefully a lot of PRM readers get to see the debut of PACK-ET-TERM 3.0 and the ST in the packet booth. In the coming months I would like to use this column as a question and answer forum for the ST computer and PACK-ET-TERM 3.0. Should any of you have any questions, you may forward them to me at ORL. I will also try and bring you current news of the ST, and other ST software and products that may be of interest to packet enthusiasts.

Next month, a report on the packet exhibit at Jacksonville, and of course more on PACK-ET-TERM and the ST. Until then, Happy packeting!

- PRM -

IS THE APPLE MACINTOSH ROTTING AWAY?

An editorial by Bill Newkirk, WB9IVR

According to articles in PC Week Magazine, Apple Computer is due to introduce a DOS compatible Mac. This machine will be similar to the "kluged" CP/M Apple][computer where it will be a co-processed machine. Data conversion utilities supplied for going to/from the Mac data format from DOS format. This is supposed to be an improvement over the third-party MacCharlie box now sold.

The machine could also be closer to the Xerox 6085 type computer (runs ViewPoint and MS-DOS).

In either case, the MacFanatics I know start crying "Say It Ain't So" after they've read the article. (MS-DOS is a curse word to them.)

This would lead one to believe that Sculley is trying to get the Apple Computer Corporation out of its 1 product status. An irony to this is a remark Steve Jobs made in a Playboy interview where he said "(IBM) absolutely wants it all", and at the same time was introducing a closed-architecture computer.

So, did Apple make the same mistake Sony made with the Beta video tape system? That is, not working out industry standards and going it alone. You sure didn't see Sony make that mistake again on Compact Discs and 8 millimeter video tape. Can Sculley pull a rabbit out of his hat? We'll know more next year.

- PRM -

AN UPDATE ON THE CONNECTIONLESS EMERGENCY TRAFFIC SYSTEM

Bob Bruninga, WB4APR

This article updates/corrects the July 1986 PRM article about the Connectionless Emergency Traffic System (CETS) and summarizes the lessons learned on the use of CETS during the July 26, 1986 National Disaster Medical Exercise held in the Washington, DC area. Further details of the exercise will be published in the next AMRAD newsletter.

CETS PROGRAM

To the operator, A CETS station looks just like a WORLI type packet BBS system and uses all of the familiar commands for sending, reading, listing messages and downloading files. The major difference is in the absence of a discrete auto-forwarding sequence and in its place, a continuous background exchange of message lines which is transparent to the user in near real time.

The actual protocol we used is based on a 6 digit hour/minute/second serial number, a message type identifier, a routing path identifier, and a packet type identifier as follows:

```
BWIAPT>DC.GEN112643T1:Subject line etc.  
BWIAPT>DC.GEN:112644T1/Continuation line of text  
DC.GEN>BWIAPT:112643T1!      ACK  
                             Text of subj. or mesg.  
                             Line term. character  
                             ID character  
                             Path indicator digit  
                             Type character  
                             Time group  
                             TNC monitor format with  
6 digit from and to calls
```

Three additional bytes are added to the six digit time stamp. One byte indicates the type of message. This is a space or an optional character, not a function of system software that is assigned by the originator of a message to make selective listing of the various message types possible. The second byte indicates the repeater path used so that ACK packets will use the correct return path. The third byte identifies the packet as either a subject line, a continuation line, or an ACK. A colon identifies a subject line, a slash identifies a continuation line, and an exclamation point indicates an ACK. A single quote mark indicates the end of a line. It is used to verify a complete line has been received and not accidentally truncated due to buffer overflow.

NDMS EXERCISE

With as many as 50 area hospitals participating in the NDMS exercise, the communications network was organized as 8 CETS hub stations which would receive the traffic from the disaster site and then relay by voice to the individual hospitals. During the exercise, 58 patient transport notifications (PTNs) were transmitted through the CETS network. These PTNs provided detailed tag numbers, bed codes, and injury codes for 119 patients and head counts for and additional 187.

SUMMARY

The CETS software performed to expectations even under adverse conditions. Unfortunately, however, a last minute decision by the PG County disaster personnel to pass all PTN traffic by voice first prior to handing the data over to the CETS system gave the remote users a skewed impression. Since all PTNs were passed by voice first, the data was 10 to 15 minutes stale by the time it arrived at the CETS van. CETS data entry proceeded at the projected rate of one PTN per minute and although the data was delivered through the CETS network in a nominal 5 minutes, the fact that it arrived 15 to 20 minutes after the voice report gave the receivers of the data a poor impression. For this reason, complexity of hauling a computer, TNC, radio, disk drives, CRT, printer and UPS power source into the field should be evaluated on a case by case basis. If the data to be transmitted is really short, voice ops may be the simpler choice. When long messages of record type content are desired, a normal AX.25 point to point net should be used. The CETS system was designed for the specific application of many short messages needed to be transmitted among many different stations in near real time. It can best be described as a multi-user, distributed WORLI BBS system with full-time access for all users and no auto-forwarding modes or lengthy delays.

CONCLUSIONS

I clearly believe that some form of CETS protocol is a necessity in this form of emergency exercise traffic handling situation. This implementation on the C-64 having to use the monitor/unproto mode of existing TNCs, however, is cumbersome at best. The proposed CETS protocol, though, does have merit in the existing environment of TNCs and the absence of a network layer protocol.

The program is experimental and should be considered as an interim solution to the network dilemma. Copies of the program are available for a \$5.00 contribution and a formatted disk, but should only be requested by good BASIC programmers interested in evaluating such a system. The program includes a significant simulator to demonstrate program operation in a seven station CETS network.

-PRM-

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PC XT CLONE 10 MEG HARD DISK, 360K FLOPPY AND 640K RAM. INCLUDES MULTIFUNCTION I/O CARD WITH GAME, PRINTER, RS232 PORTS AND REAL TIME CLOCK. IT HAS MONOGRAPHICS CARD AND AMBER MONITOR. KEYBOARD IS THE "AT" STYLE AND IS IN AN "AT" STYLE CASE WITH A 180 WATT POWER SUPPLY. THE HARD DISK IS LOADED WITH SOFTWARE. \$1350. TED HUF, K4NTA, PHONE 305-692-0728.

- PRM -

Kantronics Introduces

2400 BAUD PACKET*

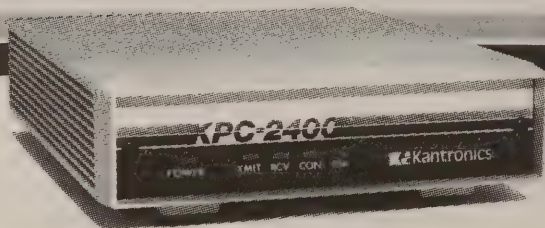
***Not Just For All Computers
But For All TNC's Too!***

WHY 2400 BAUD?

Packet channels are congested, and faster is better. So Kantronics has designed a 2400 baud PSK (phase shift keying) modem and included it in an all new KPC-2400. In addition, we are making this modem available in PC-board form to add to your TNC-1 or TNC-2, cables included! If you have a KPC-1 or KPC-2, we'll take it in trade for a new KPC-2400.

Since October 28, 1982, the rules have allowed for baud rates up to 19.6K. Of course, we've

all been operating at 1200 baud with Bel 102 (1200 baud) standard tones. However, the bandwidth of our radios is fully capable of running up to 2400 baud, giving us congestion relief. Our phase shift modem (PSK) takes advantage of the bandwidth available and the reasonable linearity of the audio channels, and it is designed with the V.26TER CCITT specification in mind. To add to your TNC or trade for a new KPC-2400, see facing page.



KPC-2400

***All the Features of KPC-2
Plus 2400 Baud***

KPC-2400 Features

- AX.25 version 2 software
- Supports multiple connects
- All EPROM software is Kantronics written and U.S. copyrighted
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 - we keep you on the air

When we set out to design the KPC-2400™, we wanted it to be compatible with existing units, and it is. The KPC-2400 features both the KPC-2 modem for 300 baud HF and 1200 baud VHF work, and a new phase shift keying (PSK) modem for 2400 baud operation. All modes are software selectable with HBAUD command!

In addition, we've retained the RS-232/TTL jumper for easy direct interface to PC compatibles or the VIC/C-64 series. Hence, with the KPC-2400 you get HF, VHF, and 2400 baud packet with all computers that have a serial port, all in one!

The KPC-2400 of course, retains the version 2 software with multiple connects, and we've included an on-board memory diagnostic routine too.

Suggested Retail \$329.00

Speed up your local area network with the new **2400 TNC Modem™**. The 2400 TNC Modem is a PC-board that mounts directly above your existing TNC PC-board. By adding the 2400 TNC Modem to TNC-1 or 2, you gain 2400 baud while retaining 1200 baud operation, switch selectable.

Two 2400 TNC Modems will be available—one for TNC-1's, and another for TNC-2's. If you purchased a TNC-1 or TNC-2, manufactured or kit version, the 2400 TNC Modem should be compatible. If you have a home brew case, the installation may require case modification.

The 2400 TNC Modem will be available in late June. You may order the 2400 TNC Modem through a Kantronics dealer or directly through Kantronics, using check, money order, Visa or Mastercard. *Suggested Retail \$149.00 (includes shipping).*

Speed Up Your TNC-1 Or TNC-2 To 2400 BAUD*

Trade In Your KPC-1 Or KPC-2 For a New KPC-2400

That's right—Now you can trade in your Packet Communicator (KPC-1), or KPC-2, and for just \$149.00, you'll receive a NEW KPC-2400!

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You may also schedule your exchange by calling the Kantronics order desk and giving your Visa or MC number. Just call (913)842-7745 between 9-12, 1-4 (Central Standard

KPC-2400 EXCHANGE SCHEDULING FORM

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When it is time to return your unit, please **DO NOT SEND BACK ANY CONNECTORS, CABLES OR POWER SUPPLIES**. Send back only the unit itself. Any cables, connectors, or power supplies received will not be returned. You will receive a new manual and a 9-pin connector with your new KPC-2400.

Name _____ Call Sign _____
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Unit to be exchanged (check one) _____ KPC-1 _____ KPC-2
Serial Number _____
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Any unit returned to the factory without payment, authorization number and prior scheduling will not receive priority placement

Time) Monday-Friday, and we'll take it from there.

To guarantee a quick turn-around time, Kantronics is *scheduling ALL exchanges*, and assigning authorization numbers. Any unit returned to the factory without prior scheduling and authorization number will not be given priority placement.

* KPC-2400 operates with a 2400 bits-per-second (BPS) data rate in the 2400 mode. The signal rate of 2400 BPS is derived from a DIBIT data stream operating at 1200 baud. Therefore, the 2400 mode may be used above 28 MHz.

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FREQUENCY AGILE C-64 BBS

Bob Bruninga, WB4APR
59 Southgate Ave
Annapolis, MD 21401

In the July 86 issue of PRM, Joe Burnham described my C-64 BBS program and gave a good accounting of its features and limitations. He mentioned the Cellular concept of small message systems serving a LAN and being linked to each other and other WORLI type BBSs for network connectivity. He did, however, omit the most important feature of the C-64 software in supporting such a concept, frequency agility.

My C-64 BBS software can not only support dual ports just like the WORLI Big Brothers, but more importantly, it provides two TTL output bits on the user port for frequency control of the link radio. The dual port capability with two separate radios and TNCs is only needed when the radios are on different bands with different channel baud rates such as HF and VHF. For multiple channel operations on the same band, only one TNC and radio is required, as long as the software can have control of the radio frequency.

The two frequency control bits can provide four combinations of frequencies under the control of the entries in the FWD.TNC table. This allows the most important feature of the LAN BBS software. It can exist autonomously on its own isolated frequency serving its local community of users. Whenever a message is posted indicating further routing, the BBS switches frequency according to the FWD.TNC file and forwards into the next BBS either direct or through a digipeater on that BBS's home frequency. Immediately after completing the forwarding operation, it returns to its home frequency to be available to its own users again. In this way, each BBS can be on its own frequency and still have connectivity to all the others. How does this work with non-agile BBSs such as the WORLI ones? Simple. A time window can be specified to force the C-64 BBS to go camp on the backbone channel or channel of a neighbor WORLI BBS such as between 0230 and 0530 in the morning for it to be available to receive incoming traffic from the non-agile BBS.

It is this frequency agility that makes the LAN concept work. If all of the BBSs have to be on the same frequency in order to have connectivity, then one user on one BBS can QRM all of the others and no advantage is gained by having many smaller BBS LANs.

One other feature recently added to the C-64 BBS software is a bulletin list download capability. To help support the LAN concept and keep local users off of the main WORLI BBS frequencies where possible, the C-64 will call up its neighbor WORLI BBS once a day probably about six o'clock in the morning and do an "LB" command. The resulting Bulletins List will be stored in the C-64 BBS system as a single message, available for users of the LAN. This way, they don't have to compete with the other hundreds of users on the main WORLI BBS frequency just to see if there are any new bulletins of interest. If they do see something they like, then, they can stand in line and at least know what they are after when they finally do get a chance to connect.

To avoid unnecessary waste of space, the Bulletins List is truncated to the last 21 listings only.

The C-64 Frequency Agile BBS program was not designed to replace or compete with the much more capable WORLI systems, but to augment their capabilities and make the delivery of mail to local users more efficient for the WORLI system. It accomplishes this through operation on a separate frequency from the main BBS channel while still maintaining connectivity. Local users may enter their messages locally at keyboard speeds tying up the C-64 BBS as long as they want and as soon as they logoff, the C-64 QSY's to pass the traffic along at machine speeds. (It does not forward at a given time every hour, but immediately and every 50 minutes thereafter.) Finally, it gives the WORLI BBS a place to dump traffic for local users so that each one of them doesn't have to log on to the main channel and go through the lengthy process of checking their mail. They can do this on the C-64 BBS LAN frequency.

The software is available at my address above, but please send a FORMATTED disk along with a \$5 contribution to make all this program copying worthwhile. Thanks.

- PRM -

HAMILTON AREA PACKET NETWORK NOTES

The following bulletins from John, VE3DVV, describe the Hamilton Area Packet Network's (HAPN) recent activities.

HAPN bulletin #1 14-jun-86

At present the HAPN is running tests with 4800 baud on 145.65 MHz. There are two repeaters on this frequency, a 1200 and a 4800 baud repeater. The repeaters will echo any 1200 or 4800 packets, but the beacons being transmitted every 5 min are in V1 (1200) and V2 (4800). The 1200 baud repeater is in Erin Mills and the 4800 machine at my place in Mount Hope. By listening you can tell the difference between packets.

The 4800 baud modem here is wired up on the HAPN-1 adapter card on the prototyping area on the board. For 4800 we tested the modem on a number of rigs and they all seem to work ok. The 4800 baud repeater uses an IC22s and my HAPN-1 uses an Icom IC27a. The initial test results with file transfers are very good.

HAPN bulletin #2 23-jun-86

At present the HAPN is running tests with 4800 baud on 145.65. We are considering making the modem available for TNCs other than HAPN or VADCG. We anticipate designing a circuit board for the most common TNCs around. Since we don't have much experience with interfacing to the commercial TNCs we are looking for technical information, such as circuit diagrams, specifications on the radio interface, and which TNCs have been successfully tested on other than 1200 baud. Also some TNCs are using external clocking. What kind of clocking is required? What are the interfaces levels TTL/RS232 ? We like to hear from fellows who have experience in this field.

**KANTRONICS TNC MODS TO
IMPROVE PACKET COPY**

HAPN demonstrated a 4800 baud QSO at the Ontario fleamarket in Milton on 12-Jul-86. The rig was IC27a running 25 watts into a mag-mount antenna on the hood of a car. The TNC was an HAPN-1 adapter with a 4800 baud modem added on the prototype area (see picture on cover of PRM).

The remote station was VE3DNM in Hamilton running a Kenwood 7930 at 5 watts. The signals were marginal due to the poor location, escarpment, wx etc. The first LED on IC27a was repeatedly going out indicating a signal strength around S1 to S2 (first LED).

Despite the poor signal we managed to transfer an 138K binary file from the test site in Hamilton. The file transfer was successful. The file contained an high resolution satellite picture showing Baffin Island (NE Canada). The picture contained the visible as well as infrared image and was displayed on a Robot 1200 like SSTV scanconverter in RGB. The picture had been received by Glen VE3DNL from NOAA-7 using home brew equipment. The picture was translated to a color SSTV format suitable for display on a SSTV scan converter and forwarded on packet. Glen used an Imsai Z80 system with an VADCG TNC for packet radio. The picture contained all original data and did not suffer from degradation as is common by analog transmission means.

By the way, the packet protocol used was AX25, but we feel V2 would have been better under the marginal conditions.

The response to our article describing the HAPN-1 adapter board in the August issue of HAM RADIO is great. It showed a picture of a prototype on the front cover. We suggest that anyone interested in the technical details have a look at the article.

The artwork on the 4800 baud modem beta boards is now completed and an initial run of 20 boards is being made. These boards are designed for the VADCG TNC (or others) with an RS232 interface. The beta test sites will also test the boards on other TNCs like TAPR by bypassing the RS232 chips. The modem features an on board DCD circuit that switches in abt 10-15 MS. The modem interfaces directly to the modulator and demodulator in the 2 m radio. The normal squelch and volume control on the radio are not used for packet. This modification has been tried on a number of radios and turned out to be quite easy. Due to the higher baudrate and fast modem squelch operation file transfers go almost 4 times faster.

We intend to utilize our 2 m channels more efficiently on the local network without the expense of having to buy another radio. This way we can make packet more enjoyable like we once did with voice on the low bands when we switched from AM to SSB.

The following message from John, WD4OQC, in the Knoxville, Tennessee area has appeared on many Mail-Boxes and might be of interest to those who are using Kantronics KPC TNCs.

Via K4EID: 4393 From WD4OQC KANTRONICS TNC FIX

A problem has been found in the Kantronics KPC TNC, all versions. The Push-to-Talk circuit has a fault in its design that results in interference to some rigs. Rigs affected will be those which use a "leaky audio" line for keying, such as the ICOM HTs or any rig with a fast, solid state T-R switch.

The problem arises from the interface between the 6803 microprocessor and the PTT circuit in the TNC. The PTT pin on the radio connector is driven from a 6803 port bit by a cascode transistor combination Q3 & Q2. This combination presents the microcomputer with a hi impedance load which is the source of the problem.

The port used is a bit-addressable port. this means that the TNC software can address each bit in the port Byte individually. One bit is used for PTT, another pair are used for the CTS and RTS lines on the serial interface, and a couple make up the modem interface. Each bit can be configured as an input or an output bit.

The problem is that each time the 6803 addresses the port, a high speed glitch is produced on the bits that are configured as outputs. This results in a few nanosecond wide glitch that in the TNCs we've looked at, occure at a repetition rate of about 14Khz. The high impedance and capacitance cascode PTT driver circuit stretches this pulse its way to the PTT pin of the radio. The end result is a large amount of hash appearing on the PTT pin. The hash is variable and is worse when the TNC has received a multi-packet group.

On radios that combine Tx audio and PTT, such as the ICOM, the result is garbled packets. The primary symptom seen is that the station will only decode and ACK the first packet in a multi-packet group, resulting in many retries. Radios with fast T-R switching can also be affected.

Fortunately, the solution is simply the addition of a small capacitor to slow down the response of the PTT circuit. Locate Q3 on the circuit board. It's near the center right looking from the front. Solder a 0.01uF capacitor between the base and emitter of Q3. This swamps the the base with capacitance and shunts the spikes.

Three TNCs in our area have been examined. All had the same problem and all responded to the fix. Would like to thank Rich, AA4KS, of PETS in Knoxville for first identifying the problem and testing my SWAG (scientific wild-a__ed guess) fix. Happy packeteering. john, wd4oqc.

FADCA > BEACON

THE FLORIDA AMATEUR DIGITAL COMMUNICATIONS ASSOCIATION

BYTES FROM THE WRITE-ONLY MEMORY

Ted Huf, K4NTA

I will keep it short this month because we have a lot for the FADCA>BEACON page this month. I really want to thank the fellows who contribute to the effort of putting together this part of PRM. I could not do it by myself. We could use more news of what is going on in your area. It does not have to be in the finished form, just send me a message on the MailBox system of what is going on in your area and I will include it here. Others would like to know!

I want to congratulate Chuck Harrington, WA4GPK on his fine work with the Atari 520 ST. I saw the terminal program that he wrote while at the Jacksonville Hamfest and it is a fine piece of work. One of his next efforts might be a WORLI type BBS written in C so that it could be ported to other machines.

- PRM -

FADCA BOD NOTES

The FADCA Board of Directors held an informal meeting at the Jacksonville Hamfest in August. The following items were discussed.

1) Elections for the directors' positions are due. Jim Diggs will organize and conduct the elections with administrative support from Gwyn Reedy.

2) The results of the balloting will be announced at a FADCA annual meeting to be held in early November in a centrally located site. Jim Diggs will make the meeting arrangements.

3) The Board members support and encourage the activities of FADCA's Packet Frequency Coordinating Committee and FADCA Network Coordinating Committee.

4) Next years goals for FADCA should be to build motivation and enthusiasm for packet networking through educational activities. It was recommended that a video tape be prepared for distribution and that an 820 MailBox be built for use in demonstrations at hamfests throughout the state. Rick Mixon volunteered to assemble the system if parts are donated, and see that it is sent to the major hamfests for use by persons manning the local booth.

5) FADCA should support N2WX's network software development by providing an 820 system for his use.

- PRM -

CENTRAL FLORIDA PACKET NET

Doug Hubbs, KF4TM

The purpose of the Central Florida Packet Net is manifold in that we encourage activity of packet communications via VHF, the handling of formal traffic and bulletins. It is hoped that the above stated items will promote friendship among all amateurs of the central Florida region while improving our operating techniques.

Of the utmost priority, is the fact that Packet Networking is the most effective use of the spectrum and in being such, the most effective communications mode during an emergency when traffic handling needs to be ACCURATE and fast for effectiveness and usefulness.

The realization of these goals will be through the collective efforts of all operators in the area. We of the CFPN plan on being the vehicle by which all operators may attain these goals in providing the coordinated net structure, assigned liaison duties and even the opportunity to be the Net Control Station (NCS).

The planned net operations are to have sessions daily at 0130Z (Summer) and 0230Z (Winter) on the Daytona Beach digipeater (DAB) using CONVERSE MODE (unconnected). When there is traffic to be handled NCS will direct those stations involved to CONNECT and handle the traffic. These operations should last about 15 minutes per session. In the event of large volumes of items, stations will be directed to another simplex frequency to handle.

This net has outlets to all major NTS nets and several local VHF phone nets in Central Florida.

Any and all comments regarding this proposed operation (CFPN) should be directed to:

CFPN NET MANAGER
Doug Hubbs, KF4TM
1690 Second Ave
Deland, FL 32724

or through a radiogram which may be sent via 9040CF or the ORL BBS systems.

- PRM -

FOR SALE

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\$500 +shipping/bestoffer.813-681-6868Brad, KE8CW.

-PRM-

*** FADCA is coordinating our digipeaters in Fla.***
*** If you are planning to put up a digipeater, ***
*** contact FADCA at 812 Childers Loop, Brandon, ***
*** FL 33511 for registration forms. ***
*** **

Jim Diggs, K4AHO

At the meeting of the Northern Florida FNCC (FADCA Network Co-ordinating Committee) I introduced an idea that has been floating around in the back of my head for some time. The main idea was the utilization of the site at Lake Wales as a backbone network site. The Lake Wales site boasts one of the highest average height above sea level locations available in Central Florida. There is a 2 meter antenna at approximately 450 feet with feedline already installed and there is a building the digipeater equipment can share. The disadvantages of the site are a high incidence of lightning strikes and 1 hour driving time from Orlando. Nevertheless its availability outweighs the disadvantages.

The Lake Wales digi will be built with reliability in mind as well as having the ability to operate under full power and network load for several days to a week without AC Power. The generous sized cabinet will be sealed to minimize the effects of adverse weather conditions. The radio will be designed to meet the switching speed requirements of 9600 baud operation. Receiver data outputs and transmitter data inputs will be installed for both 1200 bauds audio signal and 9600 baud fsk signals. All mounting areas and wiring requirements will be designed to allow future options to be installed without shutting down the digipeater and returning it to the shop. The future options will include a remotely programmed on-board computer which will allow such things as AC Power loss warning by Beacon Mode, remote programming of TNC parameters (somewhat like the GLB), status reporting of battery voltage, internal temperature and forward and reverse power. Eventually the status reporting will include an external weather station. The 9600 baud modem will be planned for as well as a dual port operation which may allow two speed operation (1200 and 9600 baud) as well as switching a packet from one speed to another. This will allow the LAN ports to migrate to 9600 baud as time and resources permit, rather than having to make the switch all at once.

Why do I call this digi a "STAR"? With a gain antenna at 450 feet and 100 watts transmitter power I strongly believe this digipeater will serve the Melbourne, Daytona Beach, Sebring, Port Charlotte, Sarasota, Tampa/Clearwater, and Orlando directly. It may be accessible from Ocala and Stuart as well. If all these cities are located on a map and a line drawn to Lake Wales, a wheel like pattern is observed. I call this pattern a "STAR". If this digi gets the 220 linking effort out of the doldrums then it can be called a "STAR" for another reason.

The system I proposed at the FNCC meeting consist of two elements at each point of the "STAR.". The first element is a simple battery backed 220 MHZ digipeater using a gain antenna and running 100 watts. The second element would be the Local Area Network Port. This would first start out as a dual port digipeater and perhaps become a packet switch later. These ports would cross connect the Local Area Network frequency to the 220 MHZ backbone frequency. The responsibility for the construction and

operation of the dual port digi/ switches would be the LAN in which the port resided. Hopefully they would be battery backed. Individual users would be discouraged from using the backbone system directly but would be strongly encouraged to access the system thru the local LAN port. BBSs may have the option of going directly on the backbone to minimize interference with the conversations going on the LAN frequency.

Lest this effort be called more "Vaporware", I will say that the Orlando Amateur Radio Club has donated a sizeable sum to build this digipeater. The Tampa LAN is supplying the gain antenna and is responsible for its installation. This is a serious effort. I hope the Local LANs will support this effort by starting construction of their dual port digipeater. The first target date for this operation is to have the Lake Wales Digipeater installed in barebones condition by the end of October.

- PRM -

BREVARD LAN NEWS

BREVARD LAN NEWS
Bill Newkirk, WB9IVR

The South Brevard Amateur Radio Club was asked to set up a hands-on demonstration at the Space Coast Science Center on August 23/24. The exact configuration of the station is unknown at this time, but hf voice/code and vhf voice/packet operations will probably be taking place. We're looking to expose a bunch of kids to the world of Amateur Radio and maybe even pick up a few converts.

Exams at the Melbourne Hamfest will be at the Melbourne Ramada Inn, corner of Nasa Blvd. and US-1, at 9 AM and 1 PM Saturday September 6, and 10 AM on Sunday September 7. Walk-ins will be OK, but that depends on the space available. Pre-registration info is available by dropping a self-addressed, stamped envelope (also known as a SASE) to:

South Brevard Amateur Radio Club
Amateur Examinations
P. O. Box 2205
Melbourne, FL 32902-2205.

See page 76 in July QST for for information. Exams for all license classes will be given.

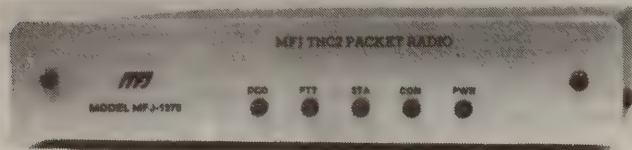
In Indian Harbour Beach, the City Council voted to reject an ordinance calling for the regulation of all antennas, towers, masts, poles, etc. We expect this to rise again as it was the Mayor's idea, and governments tend to keep after something they think they want.

It has been brought to our attention that the South Brevard Amateur Radio Club is the only ARRL Special Service Club in South Florida. We hope that this does not hold for the rest of the year.

Continued on page 19

AFFORDABLE PACKET RADIO FROM MFJ

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2 KW COAX SWITCHES

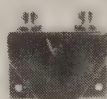
Instantly select any antenna or rig by turning a knob. Organizes coax cables and eliminates plugging and unplugging. Unused terminals are grounded to protect

your equipment for stray RF, static and lightning. 2 KW PEP, 1 KW CW. For 50 to 75 ohm. Negligible loss, SWR, and crosstalk gives high performance. SO-239s. Convenient desk or wall mounting.

MFJ-1702, \$19.95, 2 positions. Cast aluminum cavity construction gives excellent performance up to 500 MHz with better than 60 dB isolation at 450 MHz. Heavy duty, low loss switch has less than 20 milliohm contact resistance, less than 0.2 dB loss and SWR below 1:1.2. 2 x 2 1/2 x 1 inches.

MFJ-1701, \$29.95, 6 positions. White markable surface for recording ant. positions. 8 1/2 x 1 1/2 x 3 in.

MFJ-1702
\$19.95



\$29.95 MFJ-1701



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This new breakthrough MFJ Antenna Current Probe lets you monitor RF antenna currents—no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

- Indicate transmission line radiation due to high SWR, poor shielding or antenna unbalance.
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- Pinpoint RF leakage in shielded enclosures.
- Locate the best place for your mobile antenna.
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Monitors RF current by sensing magnetic field. Uses an electrostatically shielded ferrite core, FET RF amplifier, op-amp meter circuit for excellent sensitivity, selectivity. 1.8-30 MHz. Has sensitivity, bandswitch, tune controls, telescoping antenna for field strength meter. 4 x 2 x 2 inches.



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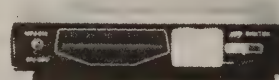
The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale.

Run up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Tune out SWR on dipoles, vees, long wires, verticals, whips, beams/quads. 10x3x7 in.

DIGITAL SWR/WATTMETER

MFJ-818
\$89.95



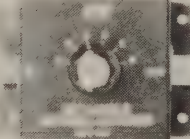
Fully automatic Digital SWR/Wattmeter reads SWR 1:1 to 1:9.9 directly and instantaneously—no SWR knob to set. Huge 0.6 inch bright orange digits make across-the-room reading easy. 12 segment LED bar graph wattmeter gives instantaneous PEP readings up to 200 watt RF output.

Good, bad, mismatch tri-color LEDs indicate SWR conditions. Small size (5 1/2 x 4 1/4 x 1 in.) and easy-to-read digital display makes it ideal for mobile use. For 50 ohm systems. 1.8-30 MHz. 12 VDC or 110 VAC with MFJ-1312, \$9.95.

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GRAPES

President: Paul Quillen, N4LCD
 Vice-President: Justin Myrick, N4LEL
 Secretary: Dave Chapman, KD4LM
 Treasurer: Garey Barrell, K4OAH

GRAPES is alive! Contrary to all current rumors, GRAPES is in better shape than ever before because we now have a system ... and IT WORKS! The reason GRAPES has not been heard from in writing is that our Newsletter Editor, Bill/WB2CPV, was lost to the overload of work and moving vans. Hopefully we'll be passing along the happenings in a timely fashion from now on.

As we all know, PACKET development took off like a rocket within Georgia during 1985 (a 300% increase within the year). When the user base got to the point of hundreds of users on one or two key digis, the system simply quit working. It was obvious that something had to be done at once. That's when we initiated the following:

1. Local LAN digis were installed to provide local coverage in order that 80% of the traffic could be moved off 145.01 and a packet could pass through Georgia (from Alabama to South Carolina) and not be crushed by local traffic.
2. The BBS's were provided with dual ports: one on the 145.01 trunk, the other on the local LAN frequency. Users were asked to talk to their BBS on the LAN side. This reduced the high volume flow from the BBS's which was adding to the problem both for the local and the interstate user. (At one time the "holding time" on one local digipeater began to approach 35 seconds prior to digipeating a packet. Timing went nuts and users found their packets colliding with their own acks.)
3. A "Prime Time" was set aside from 6 p.m. to Midnight during which only humans would be on 145.01. The BBS's would not forward to each other during this time so that interstate traffic could flow through the state and everyone could "Digi DX" without having to compete with the BBS's.

Simple? Unique? Not really. It's called cooperation. It's called structuring by agreement ... the only way Packet Radio can ever work. Without networking systems and structuring plans, how can we ever hope to send out our Packets farther than the guy next door. And if you think about that, we'd all determine it's easier to walk out in the backyard with an iced tea glass in your hand and lean on the fence (and a lot less expensive).

So, if you fellows in Carolina and Tennessee and Alabama (et al) find your packets moving through the GRAPES area more easily ... now you know why. Now you also know why you can't access the BBS's on .01 ... they ain't there!

EAL LAN Formed on .03 Bill, WA4GAI

June 7 was the first meeting of the EAL (East Atlanta LANS) and of the small group attending, the following officers were elected: CEO, Bob (KB4KIL); Treasurer, Dave (KA4IAR); Secretary, Gary (KE4ZV); and Newsletter Editor Bill. Also a Satellite Gateway Committee was formed of Bob, KB4KIL; Byron, W4BIW; Gary, KE4ZV and John, WA4BLM.

It was agreed that LAN membership dues would be \$20 of which 100% would be forwarded to the GRAPES organization (\$10 for PRM subscription and \$10 for networking facilities) and that all current GRAPES members would be grandfathered in as LAN members, but that they would go through the LAN at renewal time.

GEORGIA LANS

North - 145.09
 WB4GQX-4
 WB4GQX-3 145.09/.01 Freq. Gate
 W4KAU, W4KAU-1 145.09/.01
 (GA to Knoxville Gate)
 W4GZX (Cleveland TN Digi)

East Atlanta - 145.03
 KJ4FF-1
 WB4BXO-1 (LaGrange)
 KA4OVX 145.03/.01 Freq. Gate

Metro Atlanta - 146.13/73
 KD4NC-1
 WA4VMV Freq. Gate

West GA - 145.07

South GA - 145.09

Central GA - 145.05
 K4ICT-2

Augusta - 144.99

Savannah - 145.03

GRAPES / STATE LAN MEETING Eric, AA4SW

Letters were sent to all areas of the state announcing a meeting following the Atlanta hamfest. Represented at the meeting were the East Atlanta LAN, South Georgia LAN, East Georgia LAN and the North Georgia LAN. Since the Digi owner in the East Georgia LAN had moved, contact had been lost with the Augusta group. Agreements were made to attend one of their meetings to discuss past development of the Georgia Networking Agreement and future plans to help bring the Augusta area on line with a BBS/NNC if they desire to participate. There was also discussion concerning contacting the SE GA LAN through the Augusta group. The South Georgia LAN was represented by proxy Eric, AA4SW, and he reported on several promising new and much higher sites which may be available in the Perry and Tifton areas which should free up several lower site digis for use further south and east in the network. It seems we have lost the Valdosta digipeater, however plans are afoot to re-erect a digi in the South Georgia area as reported by Wayne. We would like to thank Larry, KF4JF for the long hours in keeping the Valdosta digi in service and providing an hf gateway for many months. The middle Georgia area was not represented, however they do have a group on 145.05 with no connectivity to the 145.01 trunk system (reported by Buck K4ABT). The West Georgia group was also not represented, but growth has been very slow in the area and died down somewhat when Buck moved to Warner Robbins. The Columbus area may wish to try using the East Atlanta LAN's West digi WB4BXO-1 on 145.03 in La Grange until activity picks back up in that area.

TAPR/GRAPES NNC DESIGN TEAM MEETS Eric, AA4SW

The TAPR/GRAPES NNC design team met for the first time just to get to know one another and map out some very tentative procedures. The team consists of John, WD4OQC of Chattanooga Gary, KE4ZV of Snellville, GA; Eric, AA4SW (ex N4CI) of Conyers, GA; Steve, WB4BXO of LaGrange, GA; and Chris, KA4OVX OF Conyers, GA.

We tend to be short on networking experience. However, that is a temporary problem. I think that others in the TAPR test group will supply arguments and justifications for various approaches and within our group, several ideas have been proposed. We have much to do prior to directions in routing and higher level protocol discussions. One benefit we will be able to offer the Alpha team is RF contact between 2 locations at the moment and if we can get 2 more systems we should be able to be a real world testbed on a reasonably good vhf/uhf topography. Some concern was still expressed about the capacity of the NNC to handle higher order network functions. This is a very packet specific board on which Lyle/TAPR has done a very good job. Suitable to sit on a mountain top with no whirlies on it and feed stuff to a bigger box at a safe location, it is a good platform to begin our network and should be fairly inexpensive to mass produce with 4-rf port capability. It should become a pretty good front end for a larger, more powerful, mini type computer. Come on fellers, where is the cheap 9600 bps deck to go with the system??? It was also decided that we will set up a telephone BBS strictly for the NNC developers. It will reside at KE4ZV and probably run on an IBM clone with a 20 meg drive. We currently are evaluating Modula-2, Pascal, and C for HL programming. The winner will probably be C but we have the others available to evaluate and test. AA4SW's unit seems to be working fine and has been tested with some small compiled C modules and KE4ZV's machine seems to have a somewhat flaky B drive which will be replaced momentarily. Thanks Lyle/TAPR for continuing to forge ahead in spite of the many sideline rock throwers. This is still a hobby and whatever comes of the project will be a fun experience and a good learning tool for some of us! A full day hot-box meeting is planned for the near future to settle on early development efforts, planning, and laying the groundwork for interfacing with the others of the ALPHA test team.

NORTH GA LAN DIGI'S

AA4EO-1	145.09 Fairmont, GA
WB4GQX-4	145.09 Amicalola Mt.
W4GZX	145.09 Cleveland, TN
NC4G-1	145.01 Rome, GA (Trunk)
WB4GQX-1	145.01 Sawnee Mt. (Trunk)
W4KAU-1	145.01 GA to Knoxville Link
W4KAU	145.09/01 Mailbox Gateway
WB4GQX-3	145.09/01 Auto Freq Switch Gate for LAN

Current elected officers of the North Georgia LAN are: President, Dick/W4KAU; Secretary-Treasurer, Cindy/K4J4U; Technical Coordinator, John/WD4OQC.

Bob Bruninga, WB4APR

Tom Victor Segalstad, LA4LN

In the Washington, DC area we have successfully moved most of the local BBS traffic off of 145.01 onto 145.05 by installing dual VHF radios on the W3IWI BBS so that EASTNET traffic can be forwarded on 145.01 with minimum QRM from local users. Two digipeaters on 145.05 assure that users throughout the metropolitan area have access to the BBS. A few other local BBSs such as the C-64 WB4APR HF gateway share 145.05 and use it for local forwarding. As more and more users join the packet revolution we are beginning to see local clubs with local interests using packet to augment their club activities. In this area our local club (not packet) was planning to put up a BBS to serve its club members and also to serve the area as a local digipeater on 145.09.

With the BBS and TNC at a members house at 40 ft. for testing it was soon apparent that all members could access the system either direct or using a near-neighbor as a digipeater. Taking a lesson from Cellular we realized that the needs of the club could be met without raising the antenna to the 200 ft. level and by keeping the antenna lower, we would see less QRM from other nearby areas using the same frequency. Certain key members agreed to leave their stations on for digipeating and extending the net to all members.

This concept would work well if regional packet coordinators would designate certain frequencies as local use only and allow no wide area digipeaters to be installed. Although no set rules would be established, a 25 watt power limit and 75 ft. antenna height limit over average terrain might suffice. By reserving two or maybe three frequencies, and a little bit of coordination, many local club could share the available frequencies and still have area coverage with minimum QRM.

This Cellular way of thinking is quite foreign to our experience as VHF repeater users but is the way to the success of CELLULAR technology. Look at your local CELLULAR antennas and you will not see them on hills or ridges; the optimum location is in the center of a valley where the geography makes a well defined local cell. In any case most antennas are on the order of 100 ft. or so. Another key to the success of CELLULAR is power control; the transmitter power of all mobiles is under the control of the central computer to assure that only the minimum power necessary is used.

The purpose of this article is not to condemn wide area digipeaters in any way, since they are the way to packet radio connectivity; but to encourage a CELLULAR approach to the design of local area networks where relatively confined areas of interest can be defined. The following frequency proposal summarizes these thoughts:

145.010 Wide area digipeaters preferably located on metropolitan fringes to link between regions (to be replaced by 220 mhz)

For those of us with limited funds for our radio hobby we may like to operate our one and only TNC-2 on both VHF and HF. In order to do this with the original TNC-2 one will at least have to:

- 1) Change communication speed from 1200 to 300 bps with the help of the rear micro-switch.
- 2) Detune the two tone-determining potentiometers (R77 & R78) at XR2206 (U16). (Demodulator tuning can be held at 1700 Hz center tone in both cases.)

What we need is a switch which will do 2) for us, and also exchange the input filter shaping components (R93 & C54) for us. The on/off switch is not essential for the TNC because the power supply switch can be used instead. Therefore the on/off switch (really a double-throw switch) can be used for VHF/HF switching instead.

Traces were cut a number of places in order to do this modification. Diode switching is applied between two pairs of tone-controlling potentiometers at the XR2206. A miniature relay switches the discrete components at the input filter.

First, the leads from R77 and R78 leading to -5v were separated, each connected to a Si-diode (1N4148). The other ends of these potentiometers were connected to a corresponding pair of new similar potentiometers (Radio Shack No. 271-340), whose other ends were likewise connected to Si-diodes. Each pair of Si-diodes were led to one switching-section of the on/off switch; the midpoint of this being led to -5v.

The other switching-section of the on/off switch is triggering a miniature double-pole double-throw relay (Radio Shack no. 275-213). The relay brings in 226 k ohm and 10 nF for R93 and C54, respectively, when in the HF mode.

Minor changes to the resistances of R81 and R82 may have to be done in order to get the new configuration aligned properly. I used a 47 k ohm resistor in parallel with R81, and a 82 k ohm resistor in parallel with R82. This will depend on the internal resistance characteristics of the Si-diodes being used.

-PRM-

145.030 Simplex, local use, or digipeaters as agreed locally

145.050 Wide area digipeaters in the center of regional activity

145.070 Local use (CELLULAR)

145.090 Local use (CELLULAR)



RMPRA > PACKET

A NEWSLETTER OF THE ROCKY MOUNTAIN PACKET RADIO ASSOCIATION

DATELINE: THE CONTINENTAL DIVIDE

Bob Gobrick, WA6ERB
President, RMPRA

"GOLDEN SPIKE AWARD": In conjunction with the "Golden Packet Award" being offered by the Pacific Packet Radio Society (July, 86 issue of PRM), the Rocky Mountain Packet Radio Association is offering the prestigious "Golden Spike Award" in the spirit of the brave Western packeteers who complete the link across the Continental Divide. The award is being offered to packeteers in the bordering states that are able to establish links into the Great Rocky Mountain backbone system (Grand Junction east to the Front Range corridor of Cheyenne, Loveland, Denver, Colorado Springs, Pueblo and soon Albuquerque).

On the Western front, the Utah Packet Radio Association gang plan to capture their award by filling the missing link between Grand Junction and Salt Lake. Gary, NB7B, Steve, WA7WAB, and others from UPRR plan to attack Blue Mountain (east of Vernal, Utah) on the weekend of August 16. From this site it's a straight shot to Grand Junction and a one-hop to Salt Lake by way of the Snowbird digipeater. Good luck to the Utah gang - this could be the Front Range link to California.

On the Eastern Front, separate groups in Nebraska and Kansas are trying to get digis high enough above the cornfields to sight the Rockies. The gang from Nebraska is pretty close to taking a shot at the Cheyenne, Wyoming mountain top digi. The Golden Spike gets nearer to being set...

COLORADO STATE HAMVENTION: Sunday, August 10, was a big recruiting day for the RMPRA packeteers. Bill, W0GVT, along with others from the RMPRA kicked off a new recruitment campaign at the Hamvention. With a display of multiple packet setups, parking lot digis, new handouts, a large "Join the Packet Revolution" banner, and a lot of enthusiasm, over 20 new packeteers joined the revolution. As an aside, the other important factor was that a local vendor - Miley's Radio, had a case of new MFJ 1270 TNCs that were completely sold out by the end of the day. It was also at this convention that Edie Sheffield, KA0MQA, an active RMPRA member, was awarded "Colorado Ham Of The Year" - congratulations Edie.

WIMU HAMVENTION: The weekend of August 1 saw the annual pilgrimage of hams from Wyoming, Idaho, Montana, Utah and Colorado merge on the resort town of Jackson Hole, Wyoming. Packet was the dominant theme of the show. Two lively and packed sessions were put on by the Utah packeteers, highlighted by guest speaker Lyle Johnson WA7GXD - president of TAPR. Lyle gave all the latest updates on the NNC project (in the Alpha stage) and information on other technical projects across the country.

PACKET RADIO MAGAZINE: I have been getting positive comments lately on our club subscription to the Packet Radio Magazine. A major benefit comes from the exchange of information in the club section - especially the hints and suggestions. One RMPRA packeteer mentioned that he was able to streamline his PBBS operation based on info he read in the club section. I would like to encourage the other clubs to keep up the flow of technical and operational information in your monthly sections. Another benefit (as rumor has it) is that the TAPR publication "Packet Status Register" will become part of PRM in September.

CLUB GOALS: At a recent Board of Directors meeting we had to do a lot of soul searching to decide what our purpose and direction should be now that we've grown beyond our infancy stage. When the RMPRA was formed two years ago it was the RMPRA packet pioneers who set up the first digis and the first PBBSs. Acting as the catalyst, we now are experiencing many Rocky Mountain repeater and ham radio clubs picking up the ball and taking over this role. Much of this is due to these organizations having the needed funds and manpower available to establish mountain top systems. With this, we re-evaluated our charter and decided that our new direction would be in supporting the Rocky Mountain ham community in the areas of education and guidance, rather than competing with them in building digis and PBBSs. This redefined charter has spun off a number of new committees - namely ones to handle technical support, standards (frequency and networking guidance) and public relations. We are now the organization that individuals and clubs can turn to for guidance on how best to use packet radio to meet their needs. Our realization was that a 100+ member RMPRA organization could not be everything to everybody (besides, how many CW and SSB only clubs do you know of). We would very much like to hear from other clubs and your role in serving the ham community. Please send Gwyn a write up on your club philosophy.

RMPRA DATA

Membership: RMPRA membership dues are \$20 annually which includes a years subscription to Packet Radio Magazine as well as the quarterly RMPRA > PACKET regional magazine.

Voice Net: Sunday 0800 RMT 3890 KHZ

Newsletter Material for RMPRA by mail, Compuserve EMAIL (70466,1405), or WA6ERB PBBS via KOHOA HF Gateway.

Address: For all RMPRA business:
Rocky Mountain Packet Radio Association
Bob Gobrick WA6ERB
14311 W. Virginia Dr.
Lakewood, CO 80228
303-986-0189

THE PACIFIC PACKET RADIO SOCIETY

PPRS NEWSLETTER FOR AUG86

Walter E. Miller, AJ6T

PPRS President

The sudden emergence in the past two months of automatic packet forwarding networks has quickly changed the scope of amateur operation in Northern California.

It is no longer necessary to fight other packeteers to gain access to remote packet bulletin board stations. With automatic forwarding in place on VHF (and partly on HF too), operators can confine most of their activity to the local BBS, and let the BBS contend among themselves to deliver messages in less than 24 hours. The rapidly evolving system already works quite well.

In addition to the software required to run these automatic routines on 820s and PC clones, a key feature in the success of this network was the appearance of multifrequency or frequency agile PBBS. The main North-South link of boards extends from Palo Alto to Rancho Cucamonga: KA6M-1, N6IIU-1, W6CUS-1, AA4RE-1, KE6BX, W6IXU, WB6KQY, WB6KHA, KD6SQ. KA6M-1 has been reactivated for DRNET and AMSAT I/O only. N6IIU-1 moves automatically from 145.07 to .09 in the early morning to exchange with the BBS on 145.09 (W6CUS-1, among others). KE6BX is dual port on .01/.09, WB6KQY in Pomona on .01/.36 (.36 is a main BBS frequency in southern California, whereas .01 and .09 are the main freqs up here in San Jose). W6CUS-1 PBBS is active on 145.09 and 7.093 (for selected BBS connections). W6IXU software now works with the WORLI auto forwarding scheme which uses the "@" symbol to target remote BBS. According to NI6A (the sysop of W6CUS-1), all of these BBS stations can forward automatically among themselves:

ARIZONA

KR5S	Sedona	145.01	7093
KE7CZ	Dewey	145.01	14.107 days
N5EDH	Camp Verde	145.01	14.107 days
K7PYK	Scottsdale	147.70/10	7093
K7BUC	Phoenix	144.51/5.11	7093 eves, 14.103 days
WB7BNI	Camp Verde	145.01	144.51/5.11

CALIFORNIA

N2DME	Sacramento	145.07	145.09
WA6NWE-1	North Highlands	145.09	
WD6BFC	Redding	145.09	
N6HAV	Fresno	145.09	
N6IIU-1	Palo Alto	145.07/.09	
KA6M-1	Palo Alto	145.07	DRNET/AMSAT
W6CUS-1	Richmond	145.09	7093
AA4RE-1	Gilroy	145.09	
KE6BX	Hollister	145.01	145.09
W6IXU	Arroyo Grande	145.01	
WB6KQY	Pomona	145.01	145.36
N6LUC-1	Camarillo	145.03	145.36
N6CUS-1	Hacienda Hts	145.03	
WB6KAJ-1	Brea	145.36	14.107
KD6SQ	Rancho Cucamonga	145.36	14.107
NK6K-2	Redondo Beach	145.36	UO11 Gateway to EASTNET (Really?)

Now that we have all this connectivity, how long will it be before level 3 networking really takes off? In the meantime, will all of this automatic operation take the pressure off already overloaded channels, or will it ultimately generate even more interference and retries? How long before the fabled "220 backbone" finally appears at 9600 baud? Only time will tell.

To send a message to a remotely linked BBS use the "S W6XYZ @ BBS" command. For example, "S AJ6T @ W6CUS" should work from any of the boards listed above. The "SF" command will leave a copy of the message at each BBS it travels through (useful for QSTs). In addition, the sysops have created an "S ALLMB" which will leave a message on all of the stations on the N-S pipeline listed above. "S MBALL" works similarly for the South-to-North path. "SF OSCAR @ ALLMB" will leave your broadcast on all BBS south of the entry station. Automatic NTS traffic can also be handled and other categories have been created. See specific instructions on the boards. In other related news, the ARRL proposal for an STA to operate HF automatic packet stations across the nation has begun to circulate. I have not seen it yet. However, the originally announced idea to limit the request to the FCC to only 15 stations seemed too restrictive to me. At the July 1986 PPRS general meeting, our organization unanimously approved NI6A's motion to request that the Pacific Division Director (KB6ZV) encourage the ARRL to request an STA for at least 50 HF stations to make the coverage more reasonable and the test results more meaningful. With traffic mushrooming on packet, only 15 stations handling all of the country's HF traffic and automatic links to VHF seems pitifully small.

The guest speaker at the July PPRS meeting was John Baxter, G4KAH. His company is ready to release a new 33cm (904 MHz) 10W FM rig. This band was recently authorized to the amateur service by the FCC. John suggested that we should "use it or lose it." His second-generation rig will be microprocessor controlled. PPRS members suggested that fast turn-around time should be an important spec on that rig.

At the August PPRS meeting, Kent Cullers, WA6TWX, described NASA's SETI (Search for Extraterrestrial Intelligence) project. Kent is a scientist at the NASA Ames Research Center. He described current theories on the evolution of the universe, and the likelihood of intelligent life around distant suns. Some scientists think that narrowband microwave signals at the "waterhole" frequency (1.4-1.6 GHz) might be the best place to look for an ETI beacon.

Satellite JAS1 has been successfully launched by the Japanese and its mode JA (analog) transponder has been working well. When will the mode JD packet operation begin? How many stations are ready with the PSK modem necessary for this transponder? Circuits were published in the Proceedings of the 5th Amateur Radio Computer Networking Conference, the JAS1 Handbook available from Project Oscar, and (best looking of all) QEX for August 1986. Is anybody planning to distribute a PSK printed circuit board? 73 de AJ6T

THE PERIPATETIC PACKETEER

KI7L

21:24 local; what to write? My "gruppenfuher" will be up through the night listening to pink noise hoping to hear the reflected radio wave of another amateur via the brief ionization caused by a small piece of the universe disintergrating in our atmosphere. No problem downloading this file at any time tonight. Hmmm, packets by meteor scatter.....higher baud rates probably needed. Nevertheless, MS is the most reliable form of radio communication (other than line of sight).

On to the real topic for this column, mountain topping, using packets of course! Sunday August 10 was spent at 11250' in one of my favorite places. I left the XYL at the Snowbird pavillion to hear the Utah Symphony reproduce Beethoven and took the tram to the top of Hidden Peak, or what's left of it after the bulldozers leveled it off for the tram station. A short hike along a ridge to Mount Baldy (every range has a Mount "Baldy"). The hike was lovely; wild flowers everywhere and still in bloom this late in the year. Still significant snow patches even lower at 9000 feet! This year is a cool one.

Huffing and puffing the lungs works to suck in the thin air, "no pain, no gain" keeps me going. Last week Martin, N7BWU, and I established that the route between Snowbird, just east of Salt Lake, and Carlin, in north central Nevada, would not provide a digipeater path to link with California. Today I am exploring additional digi link paths.

The portable system I am using consists of an IC-02AT driving an Alinco 30 Watt amplifier with a GaAsFET preamp operating through a homebrew 3 element delta loop portable antenna. The whole system easily fits in a small rucksack and weighs little, except for the 2.5 amp hr gel-cell. A few cables and ARRL's little red book complete the 300W ERP 2 meter station. N7BHC will of course disagree since SSB is missing. Anyway I am happy with the outfit since its powerful, light weight and able to communicate with the vast majority that inhabit 2M. Shortly, the M-100, the TNC-200 and the RS-TRP 100 battery operated printer, purchased on sale for \$99.95, will comprise my truly portable packet station. This system will of course not fit neatly into an 'attache' case (see Dave's fine article in PRM Vol 1) but it will provide portable, hard copy, packet communications.

Assembled, the rig and was able to work repeaters in Kemmerer and Rock Springs in Wyoming, Grand Junction, and I am pretty sure, Leadville, Colorado. The Leadville repeater site is a good long haul but could provide an alternate link towards Denver. The Alinco 30 W amp is a nice unit and I would recommend it for any serious mountaintopper. Mount Harrison in southern Idaho was also worked, demonstrating the link possibilities to the north. I tried again to key the Carlin repeater but to no avail. That route

WIMU '86

Dave Pedersen N7BHC, Pres.

The WIMU (Wyoming-Idaho-Montana-Utah) Hamfest took place over the first weekend of August in Jackson Hole, Wyoming. Once again, packet radio was a major force at the hamfest, which is the biggest one of the year in these parts.

In past years, although packet radio has had a major role in the hamfest, the only stations in operation were the stations expressly brought into town just for the display booth by those doing the demos. This year, the growth of packet radio in this part of the world was evidenced by several people bringing their portable stations along just for the fun of it, resulting in at least 8 stations in town, including a WA7MBL BBS operated by Chris Clark, N7GNT.

The primary hands-on demonstration system included a 24" Conrac monitor at eye-level, and a banner on the wall that would not look out of place stretched across a road.

I discovered on Friday afternoon that I was giving an introductory talk the following morning, which was to be followed by Lyle Johnson, WA7GXD, giving a talk on advanced packeting. Both talks were extremely well attended.

Great strides in packet technology were made in the planning session on Friday evening with Lyle and several of the packeteers from Salt Lake, with a minimum of rewriting of the Laws of Physics. The waitress at the Pizza Hut (notice how TAPR people always eat pizza on Friday evenings at these sort of gatherings) seemed very keen to see us leave...must have been the question about discounts on pizzas by Lyle. Maybe we will tell the full story at the TAPR meeting next February. Saturday evening entertainment came in the form of a "Chuck-wagon" dinner and Western singing show at the "Bar-J", just West of Jackson. This is a must-see place if you ever get to Jackson. They served 550 people in 12 minutes the night we were there. Lyle, in a fit of loyalty to Tucson, refused to admit that the Bar-J was better than a similar establishment in Tucson, and has promised to prove it next February.

One of the side benefits of Lyle's presense at WIMU was that Chris, N7GNT, and I discovered that Lyle has been building the NNC prototypes by hand. Consequently, we are helping him out by building 16 NNCs at our place of employment, Gentner Engineering. It is very enjoyable to have a complete NNC board soldered in about 10 seconds.

Packet radio has already been placed on the agenda for next years WIMU hamfest, to be held July 31 to August 2, 1987 in Jackson Hole. CU there.

The Louisiana Amateur Packet Radio Society

[Our apologies to LAPRS for not displaying their fine new logo this month. eds.]

This article is being written on 12 August, just after the Shreveport Hamfest. The Hamfest was most enjoyable, and it was a pleasure to meet fellow packeteers from the north part of Louisiana. It seems that the packet revolution has reached every corner of the state!

Much was accomplished in Shreveport. LAPRS is now affiliated with the Louisiana Council of Amateur Radio Clubs (LCARC) and ARRL affiliation is now under way. Thanks to Jack Coffee, WD5ELJ, we now have an official LAPRS logo, and if all goes well, you may see it at the head of this column. Actually, we have two logos. One is a round shape used for patches, and the other will be used for letterheads. The letterheads are now being printed, and the patches are on order.

LAPRS now has directors representing every major metro area of the state, and they are:

1. Shreveport Metro
Jerry Thompson KA5EWC
3035 Boone St.
Shreveport 71108
316-635-6537
2. Monroe metro
E. Benson Scott AE5V
Rt.4 Box 232A
West Monroe 71291
318-396-2424
3. Alexandria metro
Guy Navarro WD5GIV
3716 McCann Dr.
Alexandria 71302
318-445-5815
4. Lake Charles metro
Sam Nelson WA5VDM
3307 E. Napoleon St.
Sulphur 70663
318-527-3481
5. Lafayette metro
Danny Griffith Jr. K5ARH
123 Normandy Rd.
Lafayette 70503
318-989-9039
6. Baton Rouge metro
Jack Coffee WD5ELJ
10026 Hackberry St.
Baton Rouge 70809
504-293-4764
7. New Orleans metro
Emile Alline Jr. NE5S
773 Rosa Ave.
Metairie 70005
504-834-6444

If you have any need to contact LAPRS concerning membership, liason, etc. please feel free to contact any of us at the home phone numbers listed above. As packet activity grows, we anticipate that more directors will be added to cover other metro areas.

LAPRS has been incorporated as a non-profit corp. Although we do not anticipate "owning" any equipment, we will certainly accept any donations of equipment that may be useful on packet. If you know of any computer equipment, stand-by power, heliax, 440 MHZ rigs, antennas, etc. not being put to good use, please let us know!

Harry Rees, WB5BZE, of Slidell digi fame, has worked out a way to use a TAPR II TNC with one radio on two frequencies. Using WA7MBL software on a PC clone, the rig normally monitors the LAN freq. (say 145.03). A control-A is embedded in the forwarding file, and when the mail is forwarded, the rig is automatically switched to 145.01 (the current inter-city link for mailboxes). At the end of forwarding, the rig returns to 145.03. There are some compromises with this scheme, so if you are interested, I'd suggest you contact Harry. If WA7MBL ever decides to release source code, we should see a lot more innovations such as this. For now though, we will have to work with and around what we've got.

We've had an excellent response to the membership form questionnaires. It is interesting to see what other interests packeteers have and I would like to share it with you. I hope to get the data together "real soon now" and publish it in this column. This is a "back burner" project, however, so don't hold my feet to the "fire"!

We have ordered the new TAPR VHS cassette by Pete Eaton. This cassette is aimed at newcomers to packet, and if it is anything like Pete's first effort, it should be a winner. It makes an excellent program at club meetings. As soon as it arrives, I will pass the word.

I am pleased with the progress LAPRS has made to date. We are off to a good start financially and have good representation across the state. Now that the start-up phase is passed, we will have to turn our attention to the road ahead. We need to start thinking about firming up our inter city links and eventually moving off 145.01 and up to 440 MHZ.

We also need to start getting ready for next hurricane season. We should start establishing packet capability in emergency situations by working with Civil Defense, the Red Cross, and other organizations. In emergencies, information arrives and departs by many different means and from many different sources. Are you prepared to handle this? Packet lends itself to portable and emergency powered operations. Is your station "ready to go"?
~73 de NE5S

- PRM -

The South Brevard Amateur Radio Club will be holding another Novice Class starting on August 25, at 6:30 PM, under the Brevard Community College/Adult Education program at Herbert Hoover Junior High School in Indialantic. Class will cost \$20 (\$10 registration, \$10 books). Contact Bill Newkirk, WB9IVR, 724-6183, for more information.

Any upcoming Novice Classes in YOUR area? Help get the word out if there is and start one if there isn't! Help is available from the ARRL and the Gordon West Radio School and others to get your "black start" program off the ground. ["Black start" refers to a power plant starting "cold" without having other power plants to help "bootstrap" them on-line.]

Remember to cover all the radio and TV stations serving your area. Send them the details with enough advance notice and you'll soon be seeing things on TV and hearing 'em on radio. Be prepared with an answering machine on the phone that will get the calls if you won't be there much.

Another good idea (that I can't remember where it came from, sorry) is to take all those old QST's, CQ's, '73, Ham Radio, etc., and leave 'em in your doctor's office with information on how to make contact taped to the inside flap. Your medical practitioner certainly won't mind having something new and different to read in the office and it just might find some more new people.

Exam schedule for Melbourne/FIT to the end of 1987.

August 16
September 6/7 (at Ramada Inn - not at FIT)
October 18
November 15
December 20

Exams begin at 10 AM, registration begins at 9:30. Exams are held at Florida Institute of Technology. Take US-192 to Babcock St, turn south on Babcock until you get to University Blvd., turn west on University Blvd. 1 block to Country Club Road. Turn north 1/10 mile to the parking lot on the left. Look to the right and see the antenna tower with ham antennas - that's the building you want. We'll be in room Q-11. More information, contact WB9IVR, or call (305) 724-6183.

Anybody given any thought to looking at other modulation schemes than frequency-shift keying used in the 202 modems in the current TNC's? Seems that might be in order now that outfits like Codex and UDS can squeeze 9600+ down a phone wire. This may also take some action by the FCC, as I believe the current restrictions are in terms of baud rate, not bandwidth.

- PRM -

FOR SALE: Packet Portable Station: Pac-Comm TNC-200 \$150; Zenith ZP-150 battery powered lap computer all set for packet, with extra memory, and IBM transfer program \$525. Bob Gobrick, WA7ERB 303-986-0189.

* * * * *

FADCA NETWORK COORDINATING COMMITTEE MINUTES

Northern Region

The first organizational meeting of the FNCC-Northern Region was held in Ocala on Saturday, July 25, 1986. K4AHO served as Moderator, and K4OZS assisted.

Sixteen persons were present representing the following LANs: S.W. FLA; CLW; TPA; ORL; GNV; JAX; and OCF.

Representatives of each LAN gave current activity reports. Two new digis were reported on the air - Perry (PRY) and Port St. Joe (PSJ). Also a new BBS in on the air in Panama City - KD4EQ.

Hardware reports - updates were given on progress with 220 MHz linking. TPA operation is now imminent, and OCF is in the final stages of development. S.W. FLA is now operating on 220, linking to TPA but not to the BBS.

K4AHO presented his plans for building the "Star of Florida", a 220MHz digi to serve as a topographical hub to be located in Lake Wales, linking outlying LANs to the central hub for relay to other LANs. Concepts for building dual-port digis at outlying LANs was discussed along with software developed by KE3Z/WD4IXI for interim use in these digis. The Lake Wales digi should be operational in about 6 months.

Considerable time was spent discussing the N2WX development of authentic Level 3 Networking software. This dual-port code, and networking code that will run on the TAPR NNC is a significant step in Florida's long-term goals of Networking/High-Speed Linking. It was reported that initial test versions of the N2WX/X820/FAD dual-port code should be available toward the end of Summer.

Good input was received from several new users of the network, which was considered valuable for future planning.

One of the most important topics of the meeting was opening for discussion the making of BBS Utilities files available for all SYSOPS. Each SYSOP agreed to compile a list of his public-domain utilities and to share these files as necessary.

It was proposed as an interim measure to help lessen one of the negative impacts that BBS's have on the network, to remove from ready access those important but long files that seem to endlessly tie up the network. SYSOPS will have a message available listing and describing those files, and describing how they could be requested and downloaded on alternate frequencies or during off-prime-time hours.

The most important breakthrough at this meeting was the agreement that BBS SYSOPS agreed to begin communications with each other regarding operations, so that each SYSOP had a better understanding of what the others were doing. Out of these discus-

sions, several important steps were taken -- (a) coordination of forwarding times is to be worked out; (b) steps are to be developed with regard to forwarding files throughout the network; (c) steps to coordinate specialized areas and avoid redundancies in files. The question of converting from Local Time to UTC (Zulu) Time was discussed and should be resolved at a future meeting.

BBS SYSOPS discussed a variety of interim measures to lessen the adverse impact on the network that the BBS's can cause, while retaining efficient message handling and inter-LAN communications. It was agreed that in future meetings, SYSOPS should continue working together on all matters common to each BBS, and as problems become resolved, to communicate these procedures to all BBS users.

The question of registering BBSs was discussed. It was agreed that such registration would lessen the negative impact on the network from uncoordinated BBS operations. Formal steps to begin such registration will be taken at a future meeting.

The TPA LAN has forwarded their PC-BBS (WA7MBL) software, courtesy of W4DPH, to be used in getting GNV back on the network.

KB4CIA agreed to prepare a SYSOP questionnaire to compile data about Northern Region BBSs. Details of this will be discussed at future meetings.

KB4LLO agreed to research the considerable data published in the last couple of years concerning network and BBS usage, with the goal in mind to provide all users with a compendium of suggested network procedures.

There was a consensus that education of new users be given a high priority by all Regions of the FNCC.

The next meeting for the Northern Region was set for October 25, 1986, in Ocala.

- PRM -

FADCA ELECTIONS

Nominations are open for the eight positions on the FADCA Board of Directors. Any member of FADCA who is a resident of the State of Florida may run for Directorship. If you would like your name on the ballot, send your full name and address, FADCA membership number, and a short resume (for publication on the ballot) to: **Jim Diggs, K4AHO , 7900 Plunkett Avenue, Orlando, FL 32810, to arrive no later than September 20th.** Jim has volunteered to handle the details of this year's election. Thanks, Jim.

- PRM -

needs to surmount the Ruby Mountains, which are apparently too high. Well, with a thunder storm moving in and the concert over soon, I packed up and started the 4 mile walk back to the car. Parry's primrose, a red flower that grows only above 10,000' in the Wasatch Mountains, was abundant on my way down. The beautiful flower, with a yellow center, grows among the rocks on talus slopes, so most people will never have the opportunity to smell its pungent, rotting meat fragrance, apparently emitted to attract flies for pollination.

73, Steve

- PRM -

UPRA DATA

MEETINGS: Held at the Heathkit Store, at 7200 South State (58E.), on the second Thursday evening of the month at 7.30 p.m. The next meeting will be on September 11.

VOICE NET: The information dissemination and question/answer net is held on Tuesday evenings at 8.45 p.m. , on the 146.02/62 repeater. Net control is Steve, N7HPR.

PBBS: The primary PBBS station for the Salt Lake City area is WA7UZ0, running the WA7MBL BBS systems with an IBM XT clone. Operation is on 145.01 MHz.

MEMBERSHIP: UPRa membership dues are \$15 annually. Additional family members sharing a newsletter pay only \$1.00.

NEWSLETTER MATERIAL: This may be sent to the address listed below, or via several electronic routes, which are either ASCII text files on IBM formatted disks or via a BBS. Contact me via the phone number below for more information. Submission deadline is slowly creeping earlier each month...call for more info.

ADDRESS: For all UPRa business:
Utah Packet Radio Association
4382 Cherryview Drive
West Valley City, Utah 84120
(801) 967-5896

- PRM -

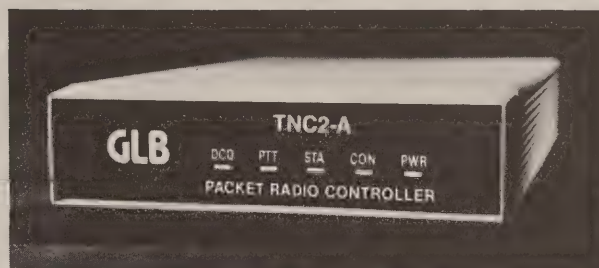
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Hardware
Software
Documentation

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SPECIFICATIONS

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shown with enhanced
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Pac-Comm DR-100 and DR-200 Packet Repeater Controllers

The Pac-Comm DR-100 and DR-200 are single-port and dual-port digital repeater (digipeater) controllers designed expressly for packet radio network uses. They are specifically configured for use at remote, unattended locations and are optimized to isolate the digital circuitry from the RF and weather conditions typically found at those sites.

HARDWARE

Both units use the Z-80 processor running at 2.4576 Mhz. There is provision for up to 32k bytes of EPROM and up to 32k bytes of RAM. The RAM has a long-life lithium back-up battery. The cpu "watchdog" timer will reset the processor in the event of software failure. The processor's RESET line is brought out for external control. The DR-200 has a Z-80 CTC to handle dual-port interrupts and scheduling functions. Both models use the 8530 Serial Communications Controller for HDLC functions. This VLSI chip has two independent, full-duplex packet ports supporting internal encoding and decoding of NRZI data without the use of state machines. The standard modem is a 7910 integrated modem chip usable at either 300 or 1200 bauds. Each port has an individual time-out timer for the radio PTT keying line. External high-speed modems can be connected to the DR-series controllers through standard modem disconnect headers.

Two methods are available for asynchronous serial communications with the DR-series controllers. The DR-100 uses the 8530's second port to provide TTL-level signals to an on-board connector. A TTL-to-RS232 adapter cable is available from Pac-Comm for this port. The TTL port is intended for temporary attachment of a terminal during setup and maintenance, and can also be used for permanent connection of a telephone modem, weather station or any serial data device. This same port is available on the DR-200, but its use disables one of the RF channels. If this is undesirable, an RS232 serial daughterboard is available for setup and maintenance. If needed, the daughterboard may remain permanently in place.

CABINETRY

The DR-series controllers are housed in a new extruded aluminum case externally identical to the TNC-200 case. Internally, there is a set of circuit board mounting rails in the upper portion of the case which can be used for accessory devices. The cabinet end plates provide metal-to-metal contact for an rf-tight seal. All external connections are soldered to feedthroughs mounted in the end plates.

SOFTWARE

Several software modules are available for the DR-series controllers. The 'KE3Z Dual Port Digipeater' written by Jon Bloom has been adapted to the DR-200. It uses an explicit routing and/or default SSID routing scheme. N2WX Level 3 code written by Howie Goldstein is also available. This program implements a virtual circuit packet switch. Both programs use the second port to support a network backbone channel which moves LAN-to-LAN packets on a separate frequency, lessening the mutual interference found in single frequency networks. The DR-100 runs either the single port version of N2WX Level 3 or standard AX.25 Level 2 Version 2 digipeater software based on the TNC-200 program. One software choice is included, additional EPROMs are available at extra cost.

AMATEUR NET PRICE SCHEDULE

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DR-100 SINGLE PORT	\$ 79.95	\$ 99.95
DR-200 DUAL PORT	\$ 139.95	\$ 159.95
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Pac-Comm Packet Radio Systems, Inc.
3652 W. Cypress Street, Tampa, FL 33607
(813) 874-2980

PACKET RADIO MAGAZINE

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PARTICIPATING ORGANIZATIONS

ALA-NET - Alabama Packet Radio Association
CAPRA - Chicago Area Packet Radio Association
FADCA - Florida Amateur Digital Communications Association
GRAPES - Georgia Radio Amateur Packet Enthusiasts Society
KCAPRG - Kansas City Area Packet Radio Group
MAPRC - Mid-Atlantic Packet Radio Council
MARDA - Mississippi Amateur Radio Digital Assn.
PPRS - Pacific Packet Radio Society
RMPRA - Rocky Mountain Packet Radio Association
TAPR - Tucson Amateur Packet Radio Corporation
UPRA - Utah Packet Radio Association

Articles and photographs are solicited dealing with any aspect of digital communications. Both technical and operational topics are desired including new product announcements and equipment reviews.

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NEWS AND VIEWS

Gwyn Reedy, W1BEL

PRM MILESTONE

This is a milestone issue of PRM in several ways. As the cover design emphasizes, the Tucson Amateur Packet Radio Corp. (TAPR) is now a participant in PACKET RADIO MAGAZINE (PRM). The famous Packet Status Register (PSR) will appear monthly as a distinct section of PRM. This is the culmination of a longstanding goal shared by myself and a number of the other TAPR directors. Circulation of the combined publication will now exceed 2200 monthly, and the initial mailing, which includes expired members will be approximately 3500.

Personally, the combination of the publications will mean the opportunity to produce a better magazine for a larger number of packeteers. I have been editing and producing the FADCA>BEACON and its outgrowth, PRM (with generous help from Brad Voss, KE8CW, and Ted Huf, K4NTA) since January 1984. The PRM circulation has grown steadily and is nearly 1000 as of August 31st. I began editing and producing the TAPR PSR in June 1985. Since that time producing 16 issues (approximately 350 editorial pages) of the two publications per year has been a heavy task, and the timeliness of the publications has suffered. In addition, there were always hard decisions to be made about which publication should carry any particular article. Now the way is cleared for a more timely (when we catch up), interesting, and authoritative packet publication. Packeteers have only one place to look for the information about what is happening in packet development.

Continued on page 14

REVIEW OF THE NEW KANTRONICS KPC-2400

John Graf, AH6CL

Reprinted from Compuserve Hamnet

The KPC-2400 is the latest in the line of TNCs offered by Kantronics, Inc. of Lawrence, Kansas. It has a suggested retail price of \$349.00. It contains features identical to their earlier KPC-2, and in addition supports packet operation at 2400 baud. It accomplishes this feat by including a separate 2400 baud modem which can be enabled via software. The 2400 baud modem, unlike the 'standard' one for 300 and 1200 baud operation, utilizes phase shift keying (PSK). Signals are sent at a bit rate of 2400 baud, but the phase shifting occurs at 1200 baud. Thus the unit may be operated legally at the new speed on all frequencies above 28 MHz.

HARDWARE:

The KPC-2400 is an attractive unit housed in an extruded aluminum case. Front panel indicators include power on, transmit (PTT), receive, connected, and STA (which indicates the presence of an unacknowledged packet). Connections are made to the computer or terminal through a standard RS-232 connector (DB-25) and to the rig through an included 9 pin connector and cable. The user is required to supply the actual connector to the rig being used. 12 volt power is supplied either from the rig (via the supplied cable), or through a separate rear connector using an AC adaptor. Speaker audio may be obtained from a rear audio jack.

Internally there are user defined jumpers which may be used to change the transmitted audio level, switch between RS-232 and TTL signal levels, and allow the user to test on-board ROM and RAM. The quality of the construction and components appeared excellent.

For those of a technical bent, the unit utilizes a 6303 microprocessor for modem and housekeeping chores; an AM7910 modem for 300 and 1200 baud operation; and a proprietary modem for 2400 baud operation. The unit comes with 16K of on-board RAM, and is expandable to 32K.

SOFTWARE:

The KPC-2400 utilizes proprietary software on EPROM and claims compatibility with Version 2.0 of the ARRL AX.25 protocol. From a user standpoint this appears to be true. The command syntax and command list are a subset of the KPC-1 and KPC-2, with some additional commands for 2400 baud operation. In general, the command set is the same as found in the TAPR-2 with few and relatively insignificant differences.

The TNC supports up to 26 multiple connects, XON/XOFF, and hardware handshaking. The ample on-board memory allows your beacon text, connect message text, budlist, suplist, and unprotocoled packet lists to be 'permed' and alleviates the need to type these items in each time you power up.

Unlike the TAPR boards, the KPC-2400 utilizes an EEPROM for storage of command variables. Thus changes made to the command set while on-line are erased upon powering down, and only the 'perm' command will cause changes to be permanent.

The unit may be operated at standard TERMINAL rates of 300, to 9600 baud, and transmission rates of 300, 400, 600, 1200, or 2400 baud. Additionally, 6 tone pairs may be selected, which include Bell 202, Bell 103, and CCITT v.21 and v.23.

DOCUMENTATION:

The documentation consists of a 66 page spiral-bound book and one errata sheet. The book was a major disappointment and gave me the impression of being hastily concocted in order to get the KPC-2400 to the market place.

There were several typographical errors. The most damaging was in the cable connection instructions where the ground leads were incorrectly identified. Luckily there is an accompanying diagram which can be used to solve the quandry. There was also an error in the identification of the XON/XOFF values which may be confusing.

The major difference between this unit and previous ones manufactured by Kantronics is the 2400 baud operation. Yet there is virtually no discussion in the manual on how to operate at this data rate. The user is left to his own devices to determine the correct settings of tone pairs, for instance. Simply entering 2400 baud operation with the 'HBAUD 2400' command could conceivably put you on the air with a tone pair that will not be read by another TNC. It was only through some additional research that the author was able to figure out the correct command sequence to get on 2400 baud operation.

On a positive note, there are some excellent examples and instructions for interconnecting various computers with the TNC, as well as examples of some simple terminal programs which may help a new user get on the air quickly.

OPERATION:

Operation so far has been simple and effective. The unit has shown no hidden bugs, and once properly configured, has been a joy to use. The commands to display correct settings and to list available commands are a real aid to operating for those of us with less than perfect memories. The unit appears to operate extremely well in marginal signal conditions, and packet retries have been minimal.

At the present time there is almost no 2400 baud operation on 2 meter packet, so it is difficult to determine how efficient this new rate will be. Kantronics claims that the Bit Error Rate (and consequently retry rate) is virtually identical to that found at 1200 baud. My limited connection time at this rate tends to agree with this claim. Of course the big advantage to 2400 baud operation is SPEED, and speed you get, in trumps. *Continued on page 13*

DIVIDE AND CONQUER

-THE FIRST STEPS TOWARD NETWORKING

Dennis Goodwin, KB7DZ, NAPRA Technical VP

Reprinted from ZERO RETRIES, Journal of the Northwest Amateur Packet Radio Assn., Vol. 2, No. 3.

Recently in the Northwest we have been able to send packets from Vancouver, B.C. down through to Southern Oregon. This has been accomplished by having many hilltop digipeaters on the same frequency. This was done as a first step to gain interest in linking. We know that this method is not ideal. It is rude and crude, but traffic does get through during non-busy hours. When busy hours come around you might as well forget getting traffic up or down the line. You won't get through. This can even affect local traffic on a local digipeater when two or more such digipeaters are adjacent. This comes about because one hilltop can hear the other one and will not hear others in its own area. You might think your local hilltop has gone deaf or dead. In actuality, it is suffering from too much of a good thing - it hears too well. How can this problem be overcome while allowing long distance traffic to flow? Read on.

Part of the key to all of this is to make sure adjacent hilltops cannot hear each other. This can be easily accomplished by having them operate on different frequencies. You say this is counter productive. In a sense you are right. Using this scheme you could not directly talk to a friend up or down the line on your local frequency. What is needed is a way to allow the hilltops to talk to each other without local traffic interfering [and to support local traffic without hindering hilltop to hilltop connectivity...ed]. The hilltops are tied together on their own linking frequency on another band.

A special digipeater will be required to allow traffic to flow into and out of the hilltop linking frequency. It will act as a normal digipeater to local traffic and at the same time have the capability to operate on the linking frequency. It will route traffic to and from the linking frequency automatically. It will know when to leave traffic on the linking frequency that is not destined for its own local frequency. You might say it will act as a traffic cop. Is this pie in the sky or is such an animal around today?

The beast in question is called a dual port digipeater. Basically it is a TNC-2 with different software and some hardware modifications. External circuitry including a modem is connected to the terminal port for the linking frequency side with the internal modem used on the local frequency. Initially the linking frequency will run at 1200 baud, but our desire is to up the data rate to 9600 baud in the future. The problem is the lack of good reliable high speed radio modems.

Work is afoot around the country to crack this nut, i.e. make it SIMPLE and CHEAP. The ultimate goal is to be able to run at 56,000 baud on the 220 MHz or higher bands. Do we need to operate at such a fast speed or are we just speed freaks?

At a data rate of 1200 baud only one conversation can reliably (minimal retries) take place up and down the coast. As the linking frequency data rate increases more and more data can get through because it is on the air for a shorter time compared with the rate you are operating at. A side benefit is that your traffic gets through faster. This allows traffic from other areas to share the linking frequency. All of this traffic may not start or end on your local frequency. Quite a bit of the traffic will be passing through the linking side of the digipeater on its way to its true destination. So, as you can see, the faster the linking speed, the more people can be served.

The dual port digipeater is just the first step towards true networking. Operations will remain basically the same as today, i.e. level 2. Long haul traffic will have increased reliability. Also, congestion will be lessened on each local frequency. The important advantage is that the radio links themselves will have been put in place for the future network node controllers (NNC) and can be easily upgraded. The future NNCs are designed to handle true networking, i.e. levels 3 and 4. That discussion is beyond the scope of this article.

I hope this has shed some light on where we are going. Linking is the exciting and challenging part of packet radio. There is room for everyone to contribute in some way. The old adage applies, "if you wait for someone to do it, it won't get done." Help of all forms is needed. Please step forward and offer to give a hand. I promise you will not be bored.

- PRM -

STEVE GOODE MAKES GOOD

Paul Newland, AD7I

Kudos to our very own Steve Goode, K9NG, as reported in the August issue of Microwaves & RF on page 62, for his article at the 1986 Vehicular Technology Conference. Quoting uWave & RF:

Steven Goode, of Motorola Inc.'s Chicago Corporate R & D Center (Schaumburg, IL) gave an important presentation on the open-loop technique for the coherent detection of minimum-shift-keyed (MSK) signals, which allows for direct observation of a recovered carrier. The application for this work is in the detection of spectrally efficient modulation methods for data transmission over land-mobile radio channels. Goode notes that a closed-loop coherent detector (a modified Costas loop) can be used to detect MSK and Gaussian minimum-shift-keyed (GMSK) modulation techniques. However, severe performance degradation in a Rayleigh fading field was observed with the closed-loop system.

Nice going Steve! Contratulations.

LOCATION IDENTIFIERS

Allan L. R. Snyder, N4US
3291 Minnow Creek Dr.
Brooksville, Fl. 33526

I've always had what might be called a proprietary interest in three-letter identifiers. The use of MLB, STU, WPB, etc., by wide area digipeaters is a good way to pinpoint the locations. It occurred to me that some background information about codes might be of interest to PRM readers and help with future selections.

About forty years ago, officials of the Air Transport Association recognized a growing need for a coordinated system of identifiers. Many two-letter codes were being used at that time. Airlines had some three-letter indicators (city codes) which they used in reservation messages.

A 'high level' inter-agency committee considered this problem, and decided to produce a three-letter identifier system for the U.S., one that would be coordinated. It would let the FAA manage it. That meant the FAA would keep the records of code assignments, publish an official list with an outline of the justification for obtaining new codes, and handle requests for additional ones.

I was working at the Washington Headquarters of the FAA at the time. My work varied, but from time I would revise some of the Government landline charts, and I kept lists of all the FAA facilities and their identifiers for that purpose.

Probably because of this aspect of my work, the inter-agency committee that had decided to have a new U.S. identifier system asked me to be the FAA member of one of their subcommittees; a working committee that would select the new identifiers.

I was not particularly impressed with the assignment, and I'm sure no one else was. To guard against any put downs, I would often remark, "You have to be real smart to handle a job like that. You have to at least be able to spell CAT".

Because the FAA would be managing the new system, I brought the FAA lists of cities and airports, and a set of code assignment check-off-blocks to the subcommittee meeting, so that I would be able to keep track of the work we would be doing. Since I was armed with all the bookkeeping equipment, the subcommittee had me do the conducting and recording. I would announce the next airport or city that required a code, examine my code blocks to find a suitable open code, pick the most obvious one I could see, and propose it to the group. The members would consider each suggestion comment on it, give approval, and I would mark it off in the code blocks so we could avoid duplication.

The scheme I tried to follow was simple: Use the first letter of the city or airport as the first letter of the identifier. Use two additional letters from the name, preferably to make up a combination with mnemonic value. (That's why the airport at Pinellas Park, Fl. is PIE). Occasionally, the

airline representatives would ask us to keep one of the old time codes. LAX is an example, it was the original Los Angeles city code.

Each selection had individual consideration, but our selection method was designed to be fast. Most of the members of the subcommittee had flown in Washington for the meetings, and had to get back home within a reasonable length of time. The job took us about ten days. The subcommittee's streamlined process inadvertently made me the chief picker.

Subsequently, the FAA had me manage the system, and I issued the "location Identifier Manual" as a listing of the new codes. I understand that it is still being published. It can be obtained from the Supt. of Documents, Printing Office, as FAA issue 7350.5k It might be possible to get a used copy from an FAA facility, such as an airport tower, or one of the flight service stations.

The new identifiers were no sooner published than the aviation public started to use them in ways unrelated to their original purpose. The airlines used them for their baggage tags, the Post Office stencilled them on airmail bags, the FAA used them for automatic data distribution, and so forth. Using them as WA digipeater locators is not as far out as it might seem.

As expected, the Coast and Geodetic Survey started to print the new identifiers on charts, the airlines started using them as call signs on their aeronautical radio ranges. (WA digipeaters note). They also went into numerous publications. In no time at all, it became very difficult to change a code. The original choices, good, bad, and indifferent, were locked in. Because of the part I played in the subcommittee's code selection method, I took a lot of flak for the bad and indifferent choices. But I feel amply rewarded whenever I see an airline baggage tag on the sidewalk in front of an airport with one of our brainstorm code selections on it. Good old litterbugs!

To sum up:

- 1) The U.S. three letter codes should be called location identifiers;
- 2) The FAA handles the administrative work for the official system;
- 3) It is unlikely that anyone would object to use of the identifiers in applications other than those for which they were originally intended, as long as there is no interference with those purposes;
- 4) It would be advantageous to adhere as closely as possible to the established and coordinated list.

The code block assignment forms previously mentioned could be handy for FADCA, or a digipeater council to keep track of the three-letter codes, if packet use of them increases.

- PRM -



CACTUS CORNER

Lyle Johnson, WA7GXD

I have really enjoyed writing for Packet Radio Magazine in this column. It has allowed me to express opinions, muddy the waters and generally have a good time without it being construed as "official TAPR policy."

However, as you will undoubtedly note (if you haven't already!), the Packet Status Register (TAPR's official publication) has merged with Packet Radio Magazine.

This has several benefits.

TAPR members will now be hearing from TAPR "officially" on a monthly basis. This certainly improves communications over the previous bi-monthly and quarterly issues of PSR and PSRQ.

It means that TAPR members will be able to easily stay informed on regional matters through PRM acting as the official newsletter of various packet groups.

It means that the Editor, Gwyn Reedy, W1BEL, will better be able to devote his limited time to PRM and PSR because he will now be editing 12 issues a year instead of 16. Thus, publication scheduling will probably improve (and Gwyn may get a chance to see his wife and kids!).

But, this new arrangement also has a liability.

Now folks can receive the PSR without being a member of TAPR.

This may be seen as a great way to save money, but it could be bad news for TAPR by diluting the already limited income derived from membership dues. Why pay for PSR when you can get it for free with your PRM subscription?

For this reason, TAPR has instituted a new dues structure that allows a person to become an Associate Member for only \$5 per year. The Associate Membership does not include a subscription to PRM; it is intended for those who already receive PRM but wish to also support packet development at the national level.

If you are not a member of TAPR, I want to take this opportunity to encourage you to join.

On a personal level, I simply lack the time to write my portions of PSR and do a regular column for PRM every month. Therefore, this will be my last Cactus Corner for the foreseeable future. On the other hand, if I am lucky I will be replaced as President of TAPR in February, in which case you may see the Cactus Corner re-appear.

Above all, Happy Packeting!

PSR

YAPP —

YET ANOTHER PACKET PROGRAM

Dick Eastman, K10JH

Reprinted from the NEPRA PacketEar

I've had the chance to use a new piece of software recently, called YAPP. YAPP is a terminal emulator program for the IBM-PC and most all of the clones. It is optimized for packet use, supporting the TAPR TNC-1 and TNC-2 software. This will include most of the TAPR clones.

This program was written by Jeff Jacobsen, WA7MBL. Jeff is well-known for writing the MS-DOS clone of the WORLI Xerox BBS. Jeff is offering this program to the amateur community under the shareware concept: It is legal to copy the disk and pass it on to someone else. If you like it, send Jeff a contribution of at least \$20.00. If you do not care for it, erase the disk or pass it on to someone else. The honor system rules here!

There are a couple of notable features of this program. First, it runs in split-screen mode. A horizontal bar appears about 20 lines down from the top of the screen. What is being received is displayed above the line, while what you type is displayed below. You may "type ahead", that is, what you type on the keyboard is not actually sent to the TNC until the ENTER or CARRIAGE RETURN key is depressed. It is possible to watch incoming text while composing an answer. The other feature is the inclusion of a method of transferring binary files. If the person on the other end is also running YAPP you may send an 8-bit .com or .EXE file or program to him. Another feature is a "gateway" to MS-DOS. With this feature, while in the midst of using the terminal emulator, you may temporarily exit to DOS, run another program, copy or erase files, etc. You may quickly exit back to YAPP at anytime, while still CONNECTED. All-in-all a rather neat program for only \$20.00.

A copy of this program may be obtained by either sending \$5.00 or by a blank, formatted disk together with an addressed, postage-paid return mailer to:

AzPRA - Arizona Packet Radio Association
c/o Wes Morris, K7PYK
7422 E McKinley St.
Scottsdale, AZ 85257

A copy should also be available for downloading from Hamnet on CompuServe.

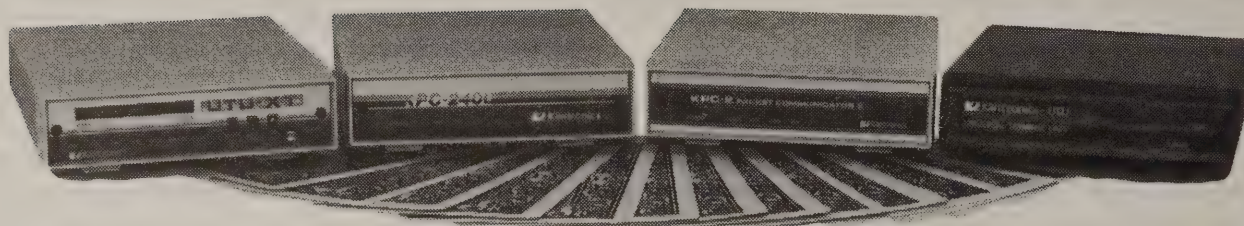
By the way, the program doesn't perform too well under DESQview or DoubleDOS, probably not under any other multi-tasking software. It apparently writes directly to the screen.

-PRM-

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UTU

UTU features switched capacitance filters and a ten-segment LED bargraph for extra easy tuning. Front panel LOCK and VALID LED indicators for AMTOR operation are also included. UTU transmits/receives CW 6-99 WPM; RTTY 60, 67, 75, 100, and 132 WPM; ASCII 110, 150, 200, and 300 baud; and AMTOR modes A, B, and L. UTU receives all RTTY shifts, and transmits on 170 HZ. **Suggested Retail \$199.95.**

KPC-2400

KPC-2400 includes all the features of the KPC-2, plus 2400 BPS packet. The KPC-2400 is fully compatible with all other TNCs because it operates at 300, 1200, and 2400 BPS, software selectable. **Suggested Retail \$329.00.**

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UTU-XT

UTU-XT features user programmable parameters, such as MARK/SPACE tones, multiple RTTY shifts, and limiter/limiterless operation. Operating with a TNC-like command structure, UTU-XT includes 54 commands, and utilizes a 6303 microcomputer, 2K RAM, NOVRAM, and 128K EPROM. UTU-XT operates CW 6-99 WPM, RTTY from 45-300 baud, ASCII from 110-300 baud, and AMTOR modes A, B, and L. **Suggested Retail \$359.00.**

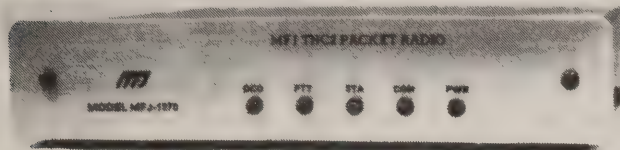
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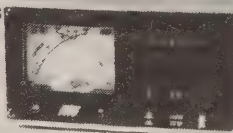
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MFJ-1701, \$29.95. 6 positions. White markable surface for recording ant. positions. 8 1/2 x 1 1/2 x 3 in.

MFJ-1702
\$19.95



\$29.95 MFJ-1701



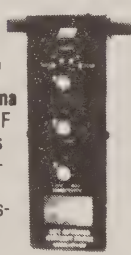
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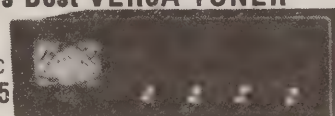
- Indicate transmission line radiation due to high SWR, poor shielding or antenna unbalance.
- Detect re-radiation from rain gutters and guy wires that can distort antenna field patterns.
- Detect RF radiation from ground leads, power cords or building wiring that can cause RFI.
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WHERE DID I SEE THAT ARTICLE?

Rich Rosen, K2RR

A key to all the articles that have appeared in QST, CQ, Ham Radio and 73 magazine since their first issue is now available. It's available in the form of a two volume set called "From Beverages Thru Oscar - A Bibliography". Contained within the 764 pages are over 36,000 references to these articles divided into 92 separate chapters.

For those interested in antennas there are dedicated chapters on Beverages, Yagis, Quads, Rhombics, Slopers and 160 meter aeralis to name a few. Construction type articles run the gamut from beginner to advanced. In the nostalgia area for those old enough to remember there was the series of articles called The Old Man that appeared in early issues of QST-they too are referenced within. As the title implies "Beverages Thru OSCAR..." references articles that go back to the wave antenna discussed by Harold H. Beverage in the 20's to various OSCARS launched within the past few years.

Besides the four leading U.S. radio amateur monthlies over 280 other magazines, journals and publications have been searched for similar subject material. The thing that makes it so valuable is that it is comprehensive. Even if your collection of magazines is limited "Beverages Thru OSCAR..." will help you utilize them to the fullest. Remember - every page was individually researched and if it appeared in the magazine a reference to it now exists. Even one-line corrections have been included.

The cost for both volume 1 (Jan. 1945-Dec 1978) and volume 2 (Jan. 1979 - Dec. 1981), direct from the publisher (Rich Rosen, K2RR) is \$40 which includes postage and handling. Volume 3 is being worked on now and in the future all three may be available on Commodore, Apple, IBM, and HP formatted discs as well.

- PRM -

"FROM BEVERAGES THRU OSCAR - A BIBLIOGRAPHY"

288 different magazines, journals and publications that include PIRE, TAP, BSTJ and QST comprise the source material for this book.

620 pages of chronological data (see "typical page"), spanning a 65 year period, is available as a book or in individual booklet form. (choose subject areas from the list below)

A need to rapidly locate articles started it all. I needed — so why not others?

LIST OF SUBJECTS

- 0001 INVERTED VEE ANTENNAS
- 0002 BEVERAGE AND OTHER WAVE ANTENNAS
- 0003 GROUND SYSTEMS
- * 0004 YAGI-UDA PARASITIC ANTENNAS
- * 0005 PROPAGATION, ASTRONOMY
- 0006 ELECTRONIC SCANNING/STEERING
- 0007 SUPER DIRECTIVE ARRAYS
- 0008 MINIATURE RECEIVING ANTENNAS
- 0009 LARGE LOOPS:QUADS, DELTAS
- 0010 SHUNT EXCITATION
- 0011 RHOMBICS
- 0012 CURTAINS (BRUCE, STERBA)
- 0013 GROUND PLANE VERTICALS
- 0014 SLOPING ANTENNAS
- 0015 BALUNS
- 0016 WIND LOADING, STRESS ANALYSIS
- 0017 COLLINS RECEIVER MODIFICATIONS (75A, 51J, S-LINE)
- 0018 GAMMA/OMEGA MATCH
- 0019 DIRECTIVE ANTENNAS, MISCELLANEOUS
- 0020 VEE ANTENNAS
- * 0021 MEASUREMENTS, TECHNIQUES AND INSTRUMENTS
- 0022 NOISE
- 0023 BROADBAND ANTENNAS
- * 0024 VERTICALS
- 0025 SITING
- 0026 LOG PERIODICS
- 0027 MINIATURE AND REDUCED-SIZE TRANSMITTING ANTENNAS
- 0028 HELICALS
- 0029 DDBR ANTENNAS
- * 0030 LINEAR AMPLIFIERS AND ASSOCIATED POWER SUPPLIES, ETC
- 0031 EICO 753 TRANSCEIVER MODIFICATIONS
- 0032 REMOTE CONTROL DEVICES
- 0033 PREAMPLIFIERS
- 0034 HEATHKIT SB SERIES MODIFICATIONS
- 0035 PHONEPATCH AND TELEPHONE CIRCUITS
- 0036 NOISE BLANKERS, LIMITERS AND GENERATORS
- 0037 ROTATORS, DRIVES AND INDICATORS
- 0038 TOWERS AND MASTS
- 0039 STACKING ANTENNAS
- 0040 PC BOARD FABRICATION AND MATERIALS
- * 0041 TUNERS, COUPLERS, TRANSMISSION LINES AND CONNECTORS
- 0042 ALTERNATE POWER SOURCES
- * 0043 CONVERTERS
- 0044 T.O.M. (THE OLD MAN)
- * 0045 NEW PRODUCTS (REVIEWS)
- 0046 SOUVELCH
- 0047 SIMPLE RIGS AND TECHNIQUES (XMTR, RCVR, CPO)
- * 0048 SIGNAL ENHANCEMENT TECHNIQUES
- * 0049 HOMEMADE CONSOLES AND CONSTRUCTION HINTS
- 0050 TRANSFORMERS, RELAYS AND TRIACS
- 0051 INDICES
- 0052 INTERFERENCE

LIST OF SUBJECTS (CONT.)

- 0053 TRAP ANT AND STUB MATCHING
- 0054 RADIO REGULATIONS AND LICENSING OVERSEAS
- 0055 TUBES
- * 0056 RECEIVERS
- 0057 VLF, LF
- * 0058 SSR
- 0059 BREAK-IN
- 0060 LOUDSPEAKERS, HEADPHONES AND MICROPHONES
- * 0061 SOLIDSTATE CIRCUITS (XMTRS, AMPS, ETC)
- 0062 HAZARDS
- 0063 COLLINEARS
- * 0064 50 MHZ AND UP (VHF/UHF/MICROWAVE ARTICLES AND CKTS)+F.M.
- * 0065 KEYS, CALLING DEVICES, READERS
- 0066 ANTENNA HARDWARE
- * 0067 SURPLUS
- * 0068 MOBILE (ANTENNAS, REGS, ETC)
- * 0069 OSCILLATORS (INCLUDING FREQUENCY SYNTHESIZERS)
- 0070 AUDIO FILTERS (PASSIVE AND ACTIVE)
- * 0071 RITTY
- 0072 AMATEUR TV, FACSIMILE
- 0073 SOLIDSTATE PWR SUPPLIES, MULTIVOLTAGE TUBE PWR SUPPLIES
- * 0074 REPEATERS
- 0075 COUNTERS, DIGITAL CLOCKS
- * 0076 PC BOARD ARTWORK (SPECIFIC CIRCUITS)
- 0077 CRYSTAL, LC AND MECHANICAL FILTERS
- 0078 INTERESTING ANTENNAS
- 0079 THEORY
- 0080 COMPONENTS
- 0081 OSCAR (SATELLITES)
- 0082 DRIVEN ARRAYS-OTHER THAN LOG PERIODICS
- 0083 160 METER ANTENNAS AND EQUIPMENT
- 0084 COMPUTERS, PROGRAMMING, MICROPROCESSORS AND PERIPHERALS
- 0085 WRITING
- 0086 BINDING MAGAZINES
- 0087 73 MAG CARTOONS
- * 0088 INTERESTING CIRCUITS
- 0089 POWER LINE CIRCUITS
- 0090 INTERESTING ARTICLES
- 0091 YAESU IMPROVEMENTS
- 0092 LASER, OPTICAL SIGNAL PROCESSING

0064	50 MHZ AND UP (VHF/UHF/MICROWAVE ARTICLES AND CKTS)	
ARI	ABBREVIATED TITLE OR TOPIC SYNOPSIS	FROM/TO PAGE
0064	144,220 & 420MHZ DISCONE ANT	0001 7812 0028
0064	DOUBLE STUB TUNER FOR 1296MHZ	0003 7812 0072
0064	1.5 GHZ DIVIDE-BY-FOUR PRESCALER	0003 7812 0084
0064	AN X BAND TRANSCEIVER	0004 7812 0064
0064	100 W 20MHZ CLASS AB, C AMP	0001 7811 0029
0064	A 2M FM SYNTHESIZER-FDBK	0001 7811 0030
0064	FOR ALIGNING 2M BEAM ELEMENTS	0001 78
0064	2M FM XMTR	0001 78
0064	2M FM TX, THRU 100M POWER AMP	0001 78
0064	2M FM TX, THRU 100M POWER AMP	0001 78

TYPICAL PAGE

Packet Status Register

Number 21



Tucson Amateur Packet Radio Corporation

PRESIDENT'S COLUMN

Lyle Johnson, WA7GXD

We hear and obey!

The April PSRQ questionnaire was responded to by nearly one-fourth of all TAPR members. This level of response is very unusual. And most gratifying.

As a part of your recommendations, PSR has merged with PRM. Beginning with this issue, PSR will be coming to you every month, along with a lot of information from regional packet groups and general packet information. Please see the Cactus Corner column in the PRM section of this magazine for a little more information on the merger.

With the increased circulation for both publications, I hope that more of you will submit material for inclusion in PRM or PSR. Please note that you can mark the submission for PSR and it will appear in the PSR section of PRM.

Elsewhere in this issue of PSR you will find an article declaring the end of DRNET and the beginning of an "official" TAPR presence on CompuServe.

TAPR may have CompuServe "Starter Kits" available at a discount (for members only) to get you up and running on CompuServe. Watch the October PSR for details.

A tutorial article on Manchester Encoding also appears for those of you curious about this method of sending your packet signals to the packet experiment (Mode JD) now orbiting as part of JAMSAT-OSCAR 12 (also known as JAS-1, JO-12 and Fuji).

TAPR volunteers are busy preparing a kit to allow you to interface a TNC 1, TNC 2 or clone to a 2 meter FM transmitter and a 70 cm receiver and work Mode JD on the newest OSCAR. Look for an update in the October PSR.

San Diego and the ARRL Nationals!

The weekend of September 5 through 7 found a lot of packeteers gathered in San Diego for the ARRL National Convention. And the Nationals.

The packet booth was manned by SANDPAC (San Diego Packet Group) volunteers with some help from out-of-towners. There was a LOT of interest in packet at this convention.

Three hours of packet forums (tutorials, introductory material, HF, emergency operation, networking, etc.) on Saturday afternoon were very well attended. I want to thank Mike Brock, WB6HHV, for his considerable efforts at coordinating the packet presence at the convention.

Many of our newer members may not realize that TAPR moved from being a loose collection of Arizonans to a serious, regional group at the ARRL Southwestern Division Convention held at the very same location as this year's national back in June of 1982!

At that time the TAPR ALPHA TNC was displayed, running a crude prototype and testing protocol over a wire link (on the air packets weren't sent successfully until a week or two later).

Being a low-budget operation, those of us who came from Tucson to San Diego that year camped on the beach. Yes, camped. In tents.

I will always remember the sight of extension cords running into a small two-man (well two-person, I shared it with my wife) tent into which were crammed two terminals, two ALPHA TNCs and about 3 people feverishly fiddling with things to get the demo in working order.

And I will never forget seeing TAPR President Den Connors, KD2S, sitting in a lawn chair halfway between the men's room and a public telephone booth (San Diego beaches are well equipped!).

What's so odd about that?

On his lap was a TI Silent 700 printing terminal. There was an extension cord running from the terminal, through the window of the men's room, to an AC outlet. On the side of the terminal was a handset from the telephone booth. Den was plugged into an on-line database service (a forerunner of DRNET)!

Anyway, we got the demo running, borrowed a portion of the SCARCC booth to set it up, hung a sign that said TAPR and signed up almost 100 members! We met a fellow named Harold Price and another named Dave Henderson. These two guys teamed up with Margaret Morrison and wrote some real packet software for the Beta TNC and later TNC 1 kits.

That was also the one time I met Vic Clark, then President of the ARRL.

In 1982, no manufacturer made packet gear for the Amateur market.

Continued on page 12

BEGINNER'S CORNER:

MANCHESTER ENCODING AND OSCAR 12

Lyle Johnson, WA7GXD

JAS-1 is in orbit!

This newest Amateur satellite, designed by Japanese Amateurs and launched by NASDA, the Japanese space agency, was lifted into orbit on an experimental H-1 rocket on August 12, 1986.

Carried aboard JO-12, as it is now designated, is a packet experiment called Mode JD.

Briefly, Mode JD is a digital packet bulletin board system. The uplink is on two meters, of which there are four channels (145.850, 145.870, 145.890 and 145.910 MHz) and the downlink on 70 cm (435.910 MHz). The uplink to a satellite is the frequency used to send information from the ground to the satellite; the downlink is the frequency used to send information back to the earth from the satellite.

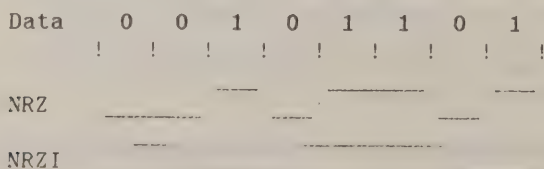
All channels run at 1200 baud, and the uplink channels are 2 meter FM! The uplink uses FM, in part because most packeteers already have access to suitable 2 meter FM gear.

The downlink channel uses phase-shift keying (PSK) modulation and will require the use of an SSB receiver and a special demodulator. This may be the subject of another article in a future PSR.

Unfortunately, a satellite is a very complex device, and an Amateur satellite is usually constrained by weight and size to be very, very small.

For the designers of Mode JD, it was important to make the circuitry as straightforward as possible. And when JAS-1 was designed, there were no CMOS HDLC chips like the SIO chip used in the TNC 2. Thus, they had to make the HDLC encoder and decoders with standard CMOS chips. To simplify the design (and save about 24 ICs!), they decided to require Manchester encoding by ground stations wishing to send data to JAS-1 on the Mode JD uplink.

Now, AX.25 is supposed to be encoded in HDLC frames and we usually send these frames at 1200 baud using FSK modems and a format called NRZI (non return to zero, inverting). As you probably recall, NRZI encodes a zero as a change in state (or tones) and a one as no change in state (the tone remains steady, whether it is a high tone or a low tone). This is illustrated below:

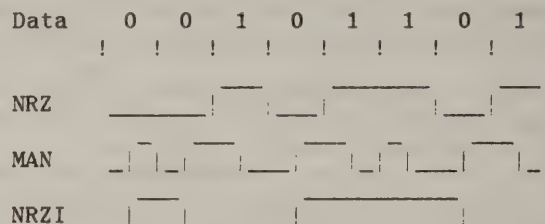


With Manchester encoding (or, more precisely, Manchester II encoding), the clock information for the data is mixed with the data and sent every bit time. A one or a zero is determined by the fact that a one has a positive-going edge in the middle of a bit and a zero has a negative-going edge in the middle of the bit.

The advantage for the satellite designers is a simplified clock recovery system. Fewer parts to find room for, and fewer parts to fail.

The disadvantage for the packeteer is that he must now have a special adapter to change his data from NRZI to Manchester format. As it turns out, JAS-1 expects the Manchester encoding to be done after the NRZI encoding. This simplifies things for us considerably!

Let's look at the same data as before, but with Manchester encoding shown as well:



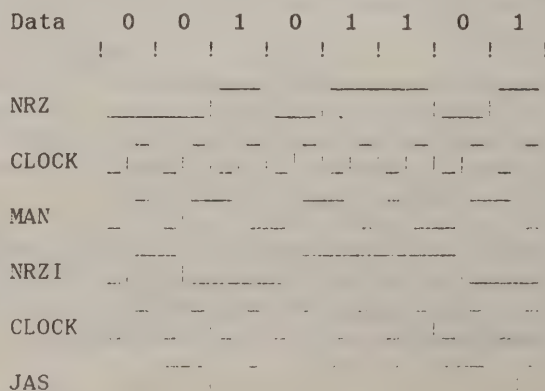
Notice that a low-going edge occurs in the middle of every 1 and a rising edge occurs at the center of every 0.

If you look carefully at the back-to-back 0s at the beginning of the data stream (left end), you will note that the Manchester data looks like a square-wave at twice the frequency of the NRZI data. In fact, Manchester encoding uses more bandwidth than NRZI for sending the same data.

However, a typical 2 meter FM transceiver can usually send Manchester-encoded 1200 baud data. Notice further that the Manchester signal has an exactly equal amount of time spent in the high and low states. This means that there is no "residual" DC component of the data, which can also help in the design of the modulator and demodulator.

"This is all well and good," you may say, "but how can I generate a Manchester signal for JAS-1? And do it cheaply!"

Let's look at our data one more time, but this time let's put our 1200 baud clock in the diagram:



The line labelled "JAS" shows Manchester encoding of the NRZI data. The line labelled "MAN" shows Manchester encoding of the NRZ data.

If you look carefully, you may notice that the JAS data is (logically speaking) the result of an exclusive-oring of the clock and NRZI data.

The truth table for an EXCLUSIVE-OR gate is:

Input A	Input B	Output
0	0	0
0	1	1
1	0	1
1	1	0

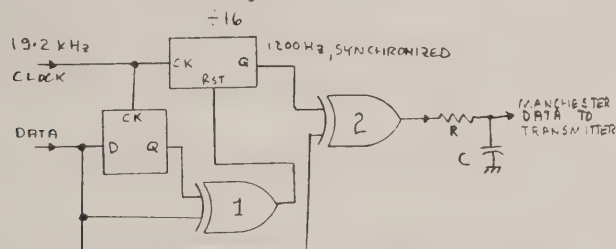
So, all we have to do is take our 1200 baud clock, exclusive-or it with our NRZI data, and apply it to our transmitter.

If you think about the waveform a little more, you will realize that it consists of pieces of square waves that are either 1200 Hz (when 0s or 1s are strung together) or 600 Hz (when 0s and 1s alternate). So, since we have no dc component, and our frequencies of interest are within the passband of a typical FM transmitter's audio response, we can simply shape the digital data itself and transmit it! We don't need any FSK modulators, or tone generators at all!

Of course, there are plenty of sidebands generated at our audio baseband, but by and large we can get the most important ones through our audio system.

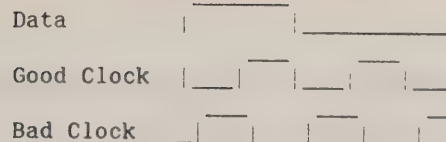
Finally, in order to minimize the bandwidth required and meet other requirements of the demodulator, our clock and data must be well synchronized.

Fortunately, the modem disconnect on TNC 1s and TNC 2s provides a signal that can be easily manipulated to provide such a synchronized clock. This is shown schematically below:



The TNC-provided clock of 19.2 kHz is 16 times the desired 1200 Hz clock signal. So, we apply the clock to a divide-by-16 counter and voila! we have our 1200 Hz clock.

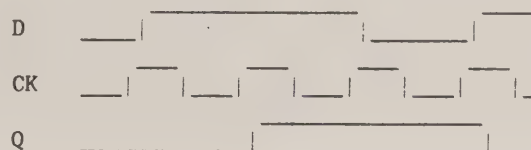
Unfortunately, even though the TNC also derives its internal 1200 Hz clock from the same source, the output of our divider has a one in 16 chance of being in the right time relationship to our data, or a 94% chance of being in the wrong phase (before the Murphy factor which guarantees that the phase will be right during prototype testing and wrong when the units are shipped to customers in the field).



This is clearly unacceptable.

So, we use a D-type flip-flop and an EXCLUSIVE-OR gate to generate a reset pulse to our counter to ensure that it is synchronized with the rising and falling edges of our data.

A "D" flip-flop makes the output line (Q) the same logic level as its input line (D) with every rising edge of the the clock line (CK). When our input data changes state (from a 0 to a 1 or vice versa), the output (Q) and input (D) will be of opposite levels for one clock pulse.



Another way of stating this is that the Q output lags the D input by one clock pulse.

EXCLUSIVE-OR gate 1 compares the D and Q levels. If they are the same, the exclusive-or output is low. If they differ (which happens whenever the data changes between 0 and 1), the output of EXCLUSIVE-OR gate 1 goes high, resetting the divide-by-16 counter at the time of the data change. Thus, the counter output is synchronized to the data. This circuit only requires one data transition to lock the clock to the data.



Next, the synchronized clock is applied to one input of EXCLUSIVE-OR gate 2, with the data applied to the other input. The output is Manchester encoded data suitable for JAS-1.

Finally, the 5-volt square-wave output from EXCLUSIVE-OR gate 2 is attenuated and shaped by filter R1 and C1 to provide a low-level audio signal suitable for application to the microphone input of a transmitter.

There you have it. Simple and cheap!

Next month I hope to get the second installment of the state machine article ready for you. Until then, keep those packets flying!

TAPR MOVES TO COMPUSERVE

Pete Eaton. WB9FLW

Effective 1 November 1986, TAPR will move its telecommunications from DRNET to Compuserve's HamNet Special Interest Group.

Over the last two years DRNET has served as a critical link during several R & D projects. Unfortunately, due to the limited accounts available on the system, many folks felt left out. In fact in TAPR's recent poll of members a large percentage of those responding urged TAPR to move DRNET's function to a more public forum. Of all the alternatives, Compuserve's Hamnet was by far the most popular, and has established itself as a prime source of packet information.

With this move TAPR hopes to make its activities and projects more well known to others around the country. At the same time it should make communications between all Packeteers more open.

- PRM -

President's Column continued from page 9

In 1986, every manufacturer is aware that packet is a very important force in Amateur radio. Four packet manufacturers had gear displayed at their booths. And distributors came with lots of TNCs. Many left with none...

What are the Nationals? (or, Packet in the Fast Lane, or Exec VPs Seem to Have All the Luck)

Unlike the Wouff Hong initiation, the Nationals are not (yet) an ARRL-sanctioned event.

Last year, in Louisville, several of us got lost on the freeway (we were "exploring" the driver said) and noticed a sign for a Malibu Raceway. We stopped in.

A Malibu Raceway is a racetrack with small, high-performance racing cars. Top speed is about 35 mph, but it seems a lot faster! We raced and decided to do it again the next night.

So we did.

The winner? None other than Dave Sumner, K1ZZ, ARRL Exec VP and General Manager. Don't let Dave's quiet, dignified manner fool you...

Anyway, there is a Malibu at San Diego, so we held the ARRL Nationals. This year's winner was Pete Eaton, WB9FLW. (Dave failed to come this year.)

Please note that Malibus are operating at Miamisburg (near Dayton and the scene of a heat won by PSR and PRM Editor Gwyn Reedy, W1BEL, during the Hamvention) and Tucson (won this year by Chris Clark, N7GNT, of Salt Lake City).

Next official race to held in Tucson at the Annual Meeting on Friday, February 20th, 1987.

TAPR MEMBERSHIP APPLICATION

Name: _____

License _____ Class: _____

Callsign: _____

Address: _____

City & State: _____ ZIP: _____

Home Phone: _____ Work Phone: _____

If you wish to have any of the above information not be published in a membership list, indicate the items you wish suppressed: _____

I hereby apply for (select one) standard/associate membership in Tucson Amateur Packet Radio Corp. I enclose \$15.00 (standard) / \$5.00 (associate) for one year's membership dues. I understand that \$10.00 of my standard dues are for subscription to the PACKET RADIO MAGAZINE (PRM). Associate members do not receive any publication. The entire amount of the associate membership dues and \$5.00 of the standard dues go to support TAPR's research and development activities in packet radio. My signature indicates that I desire to become a TAPR member, and subscribe to PRM (standard members only).

Signature: _____ Date: _____

The Tucson Amateur Packet Radio Corporation is a nonprofit scientific research and development corporation. The corporation is licensed in the state of Arizona for the purpose of designing and developing new systems for packet radio communication in the Amateur Radio Service, and for freely disseminating information acquired during and obtained from such research.

The officers of the Tucson Amateur Packet Radio Corporation are:

- Lyle Johnson, WA7GXD President
- Pete Eaton, WB9FLW Executive VP
- Heather Johnson, N7DZV Secretary
- Terry Price, N6HBB Treasurer

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TAPR membership and PSR subscription mailing address:

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P.O. Box 22888
Tucson, AZ 85734
(602) 746-1166



RMPRA > PACKET

The Official Newsletter Of The Rocky Mountain Packet Radio Assn.

RUNNING UNMODIFIED WORLI PBBS CODE ON A PC CLONE

Pete Stone, KOVLD

The popular WORLI PBBS code is written in Z80 assembly language and runs under the CP/M operating system using a customized BIOS (Binary input/output system) for the Xerox 820 computer. Since the IBM-PC and its clones use a different processor (an 8088), a different operating system (MS-DOS or PC-DOS) and different I/O hardware, it is impossible to run WORLI's code directly on a PC or clone. By using an emulator program, however, it is possible to create an environment within the PC to make the WORLI code 'think' it is running on a Xerox 820. I have recently completed a program which does just that. This program emulates the Z80 micro-processor and the CP/M and BIOS environment in the Xerox 820 thus allowing unmodified WORLI PBBS code to be run on a PC.

In order to run the emulator and the BBS code, the following are required:

- An IBM-PC or clone with at least 256K bytes of memory
- At least one 5 1/4 inch floppy disk drive
- MS-DOS or PC-DOS version 2.1 or later
- One or two IBM-PC compatible serial ports with modem cables to connect them to the TNCs
- One or two TAPR compatible TNCs
- A copy of WORLI's TNC.COM program and CONFIG.TNC file on an MS-DOS disk
- Your favorite editor for customizing the CONFIG.TNC file
- A copy of my emulator program (WORLICPM.EXE)

After customizing WORLI's CONFIG.TNC file just as you would on the Xerox 820 system, setting up your disk the way you want for BBS operation and connecting the TNCs to the serial ports, you run the emulator by typing 'WORLICPM TNC'. The BBS then comes up exactly as it would on a Xerox 820.

The primary advantage of the emulator approach is that since the same code is run in the emulator as on the Xerox 820 version, any new features added to that code are immediately available on the PC version. The main disadvantage of using an emulator is speed. While I was developing the emulator, a major concern was would it be fast enough to provide reasonable performance in BBS operation? When the code was finished, I was pleasantly surprised to find that although it 'feels' slightly slower than the Xerox 820 from the console, over the radio link there is virtually no perceptible difference in performance.

Rumor has it that Hank (WORLI) is translating his BBS code into the C language so it can be more easily ported to a variety of computers. Clearly that is the right approach. When that code is readily available, there will be no need to run an emulator version. In the meantime, however, with this emulator, all of the existing features of the the WORLI PBBS system are available on a PC.

At the time of this writing (September 18th), I have had the code on the air for a week at my home QTH and I am getting ready to distribute several copies to selected alpha sites to give it the acid test before releasing it for wider distribution. I am presently completing some of the user documentation and making some distribution arrangements. I hope to be able to release it for general distribution in early November. Interim arrangements have been made with NOCCZ to handle the distribution of the software. Expect a few weeks delay until the first diskettes are mailed. For a copy of the emulator and WORLI code, send a blank diskette and a prepaid diskette mailer to:

Andy Freeborn, NOCCZ
5222 Borrego Drive
Colorado Springs, CO 80918

As with WORLI, this code (with emulator source if desired) will be available free of charge to the amateur packet radio community.

- PRM -

KPC-2400 continued from page 2

CONCLUSIONS:

The KPC-2400 is an excellent packet TNC which has features and performance at least equal to, and perhaps superior to, the other commercially available units. The only weak point uncovered by this user was the documentation. The 2400 baud feature is a big plus which has the potential to ease some of the crowding found today on VHF packet. Whether this 2400 baud feature will become an industry standard, and whether or not the 2400 baud feature is worth the added expense of this TNC are questions that will be answered in time to come.

- PRM -

ALA -- NET

SOUTHNET IV ANNOUNCEMENT

Ala-Net and the Montgomery Amateur Radio Club are sponsoring a SOUTHNET PACKETFEST in conjunction with the Montgomery Hamfest, October 25-26, 1986. Hamfest site is the Civic Center in downtown Montgomery. Our column this month is devoted to information about the shedule of events and travel instructions.

SOUTHNET activities begin Saturday afternoon after everyone has had a chance to browse the hamfest.

SATURDAY

- 1300-1600 Packet equipment displays
 - 1300-1500 How to operate packet and packet BBSs
 - 1300-1600 Coordination meetings
 - 1500-1600 Ala-Net Meeting
- Evening Informal social and pay-as-you-go dinner at Quincy's Steak House, Ann St. at I-85, about one block from the Econolodge Motel

SUNDAY

- 1000-1200 State Activity Reports: Alabama, Florida, Georgia, Kentucky, Mississippi, Louisiana, North Carolina, South Caroling, and Tennessee
- 1200-1300 NNC (Network Node Controller) report
- 1300-1600 SOUTHNET general meeting

The schedule is still flexible and any and all presentations are welcomed. Contact Leigh Bartlow, WD4CPF, 2107 Shades Crest Rd. SE, Huntsville, AL 35801. (205) 533-5596.

OTHER DOIN'S

- FCC amateur license exams
- Ladies Program
- AMSAT meeting/forum
- FCC forum with rep from Atlanta FCC office
- ARRL and M Net
- All service MARS
- Ala Repeater Council.

Awards:

- Saturday @ 1500 - ICOM IC02AT
- Sunday @ 1400 - ICOM 745 w/PS and mic
 - VHS full featured VCR
 - ICOM 3200A V/UHF dual bander
 - Several ICOM 2ATs
 - Packet TNCs

Places to Stay:

- The Madison Hotel, within two blocks walking distance, \$42.00. (800) 228-5586, specify Montgomery Hamfest.
- Econolodge, 2 miles from hamfest site, at I-85 and Ann St. \$32.00. (800) 446-6900, specify hamfest rate.

Directions: (see map)

- The Montgomery Civic Center is located on the North side of Bibb St. between Lee and Moulton. (Bibb St. becomes Madison Ave. to the East and Herron to the West.
- From the North on I-65, exit at Clay St., continue on exit ramp to Herron St. (one way.)
- From I-85, get on I-65 headed North and follow next step.
- From the South on I-65, exit at Herron St.

Talk-in on 146.24/84, rag chew on 147.78/18 and 449.50/4.50. Autopatch on 146.04/64 (* to activate, # to deactivate, add the digit 9 before number.) Packet BBS is WB4OZN on 145.010 via MGY. Local LAN on 145.69.

Pay parking in front lot of the Civic Center, free parking in the large lot on the North side of the Center across the street.

Hope to see you there!

- PRM -

News and Views continued from page 1

Another personal milestone is that this is the last issue produced while I am an active duty member of the Air Force. (If I don't get it out the door soon, it may be the first one produced as a retiree, HI.) After 22 years of flying airplanes and desks, and lots of computer work, I'll now be devoting my energies to Pac-Comm full time. There should be some additional free time, however, to be active on the air, to run FADCA, and to produce PRM.

Several additional large packet clubs are considering joining PRM, and I expect the rate of growth to increase. The economies of larger print runs will allow more pages monthly with no increase in cost. Thanks to our advertisers for their support in paying the bills.

For the initial mailing, no steps have been taken to identify the names of persons that were previously receiving both PSR and PRM. I recommend that those of you who get dupoicate issues give one to a non-member as an inducement to encourage him to join one of the clubs. At renewal time for your various memberships, you can decide which one you wish to retain, or you can get PRM by joining a regional club.

Continued on page 22

The high tech nomad has caught a second wind. Steven K. Roberts and Maggie Victor are on their way in the second Compute Across America. Their first stop was the 86' Expo in Vancouver, B.C., where the "Winnebiko II" was on display.

The "Winnebiko II" is an even higher-tech version of the bike Steven used during his last Compute Across America trip. The "Winnebiko II" has 5 on-board computers, additional solar panels, a Yeasu transceiver, satellite data link, and of course a TNC for packet radio operation. The 8 ft, 36 speed recumbent will be Steven's home and office for the next 10,000 miles.

Watch for future press releases here in PRM and watch for Steven's call letters, KA80VA.

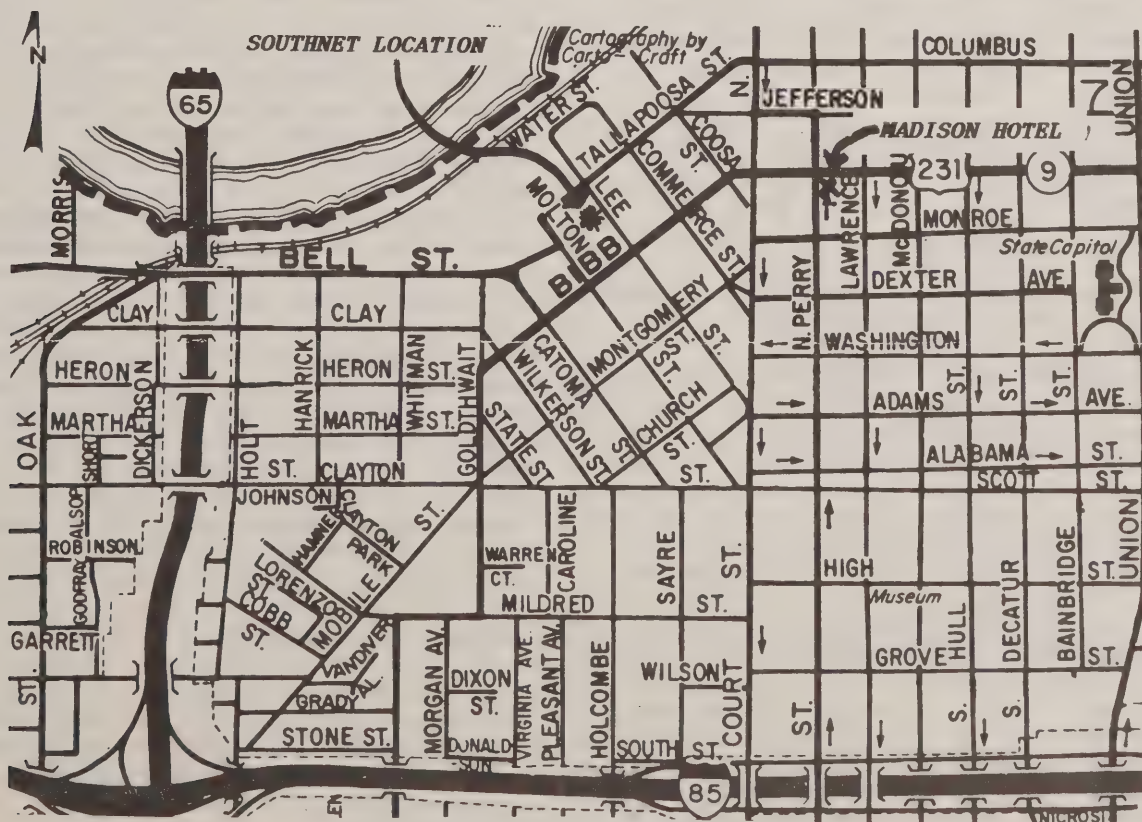
The solid line shows the route of Steve's 9,760 mile journey: the dashed line represents a rough approximation of the route he and Maggie plan to cover next. Whim and weather, of course, are sure to change this completely.

The Winnebiko II, showing the new console containing 5 computers, satellite data link, ham radio station, power management system, and more. Total weight is estimated at 225 pounds: overall length is 8 ft. Two solar panels provide 20 watts of electricity to charge batteries that run the equipment (everything except the wheels, that is, which run on pizza and omelettes).

- PRM -



Downtown Montgomery



Walter E Miller, AJ6T
PPRS President

At the September PPRS Board of Directors meeting, WB6RAL revealed that he had offered the W6AMT digipeater network (which consists of W6AMT-0,1,2,3,4,7) as a test site for Phil's TCP/IP code. One proviso was that the code must work with ordinary AX25 in addition to TCP/IP. George also reported that he is trying to convert some Mocom-70 rigs to 6 meters for packet networking. Perhaps the much-discussed "220 backbone" will show up on 6 meters instead.

WB6RAL gave the PPRS BoD a report on the recent ARRL National Convention in San Diego. Apparently everyone was buzzing about packet. AH6P told George that he will include the W6AMT chain in his beacon path from Hawaii in an effort to catch KH6-W6 long haul tropo openings automatically with packet (that path opens up a few times every summer in July or August on 2m and 70cm).

The guest speaker at the September PPRS general meeting was Chas "Woody" Woodson, W6NEY. Woody is a professor of Computer Science at UC Berkeley. He discussed coherent CW (CCW) and demonstrated its weak signal capabilities by playing some audio tapes of on-the-air CCW transmissions. The CCW receiver could recover an almost inaudible signal buried in the noise. HF CCW requires a frequency stability of about 1 part in 10 million. For details on CCW see W6NEY's articles in May/June 1981 QST.

I am trying to arrange for a speaker from the ACLU to come to the PPRS October meeting to discuss Electronic Communication Privacy Act (S.2575). If this law passes in Congress, it will be ILLEGAL TO LISTEN on portions of the radio spectrum. Plans have not been finalized yet, so keep an eye on your local BBS for the meeting announcement.

The November PPRS meeting will feature Jim Ericson, KG6EK, who will speak on LOWFERS. Unlicensed LOWFER operation is authorized by the FCC on 160-190 KHz with a power limit of 1 watt and a maximum antenna length of 50 feet. This should be an interesting session for those of you who think 160 meter operation is difficult!

Nominations for next year's PPRS president will be open at the October and November general meetings. The election will be held in December. If you are interested in any of the PPRS Board of Directors positions, please contact AJ6T. Remember that the December meeting is our annual "hardware night." We try to have as many different TNCs as possible in operation at that meeting. We need volunteers to bring their equipment and demo it to the PPRS membership. Start planning now.

CORRECTION: The correct N-S California BBS pipeline is: KA6M-1, N6IIU-1, W6CUS-1, AA4RE-1, KE6BX, W6IXU, WB6KQY, WB6KAJ-1, KD6SQ. Note that the "SF" command must be used to leave a message on all of the BBS in the pipeline.

PPRS mail can be directed to AJ6T @ W6CUS-1, via Compuserve (76625,476), or via USPS (POB 51562, Palo Alto, Ca. 94303). PPRS meetings are held the first Tuesday each month at 7:30pm at the Ampex cafeteria in Redwood City.

- PRM -

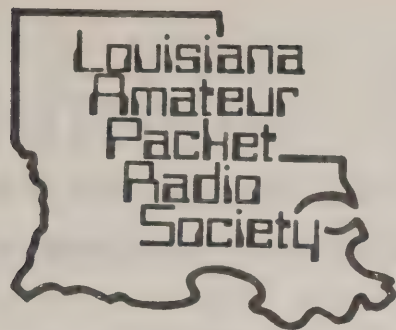
PACIFIC DIVISION ARRL CONVENTION will be held October 3rd and 4th at the Red Lion Hotel in San Jose. AJ6T will speak at 11 AM Saturday on "Northern California Packet Update" and a packet Q&A forum will be held on Sunday at 8:30 AM. The Saturday session will include a packet demo with a big screen projection TV. I hope to see many PPRS members there.

PACKET FREQUENCY COORDINATION....All repeaters and digipeaters in Northern California are coordinated by NARC (Northern Amateur Relay Council). The PPRS frequency coordinator, George Flammer (WB6RAL), assists NARC with digipeater sanctions and has provided the following list of sanctioned digis in Northern California. Notice how short the list is compared to the actual number of active digipeaters! An asterisk indicates that a request for coordination has been made, but has not been approved yet. Proper coordination will be very important for the imminent level 3 networks. Coordination of PBBS is under consideration by NARC; contact the PPRS Board of Directors if you have an opinion regarding the propriety of PBBS sanctioning.

NARC/PPRS Freq.	SANCTIONED Call	N.CALIFORNIA QTH	DIGIPEATERS (7/86) Application Date
145.01	W6AMT	Crystal Peak	1Mar85
145.01	W6AMT-1	Wilmmams Hill	1Mar85
145.01	W6AMT-7	St. John Mtn.	1Mar85
145.01	WA7DIA-1	Reno	1May85
145.03	WA6FSP-1	Melcher Hill	3)*Y85*
145.03	N6DBT-1	Livermore	3Sep85*
145.03	N6DBT-2	Fremont Peak	3Sep85*
145.03	W6OA-1	West Obs. Pt.	18Dec85*
145.03	W6PW-1		1Jan86*
145.05	WB6RFW	Montebello Ridge	7Jan86*
145.07	WB6KHP-7	East San Jose	3Dec85*
145	6CMU-1	Berkeley Hills	15Sep85*
145.09	WA6OSA-3	Bald Mtn.	15Sep85*
223.56	NT6V-1	Grizzly Peak	8Feb86*
441.50	WB6CFD-1	Pleasanton	20Mar86*

Here is a report from Dave Engle, KE6ZE, regarding KA9Q's recent visit to the SF Bay Area:

"Phil Karn, KA9Q, came to Monterey on business to attend a TCP/IP vendors conference. While he was there he took out a little time to visit some of our local packeteers and swap tall tales. As some of you may know, Phil is involved professionally with TCP/IP datagram communications. He is the most active proponent of datagram (packet) protocols for Amateur Radio use in the above-layer-3 protocols. Things have been going slowly for Phil as he didn't know where he could test TCP/IP. It was suggested that maybe we could test the stuff for him out here. Phil was agreeable to this, and sometime in the future we may be able to put up a test case for TCP/IP long haul communications here in the Bay Area. The visit was relatively short, so not much else was covered. Those able to see KA9Q were W3VS, AA4RE, WD6CMU, KA6M, N6FQR, WB6RAL and KE6ZE."



The Official Newsletter of the LOUISIANA AMATEUR PACKET RADIO SOCIETY

Jack Coffee, WD5ELJ

At least eight 145.01 digipeaters have been installed in the State to date: LCH, HIG (Lafayette), BTR, SLI, MSY, AEX (testing at this writing), SHV, and Bastrop. Hammond (HMU) is in the process of collecting the needed equipment for their digi and it should also be on the air by the time this reaches print.

LAPRS has the State separated into seven 'major metro areas': SHV, MLU, AEX, LCH, LFT, BTR, and MSY), with each area furnishing one elected director to LAPRS. Each of the areas, containing certain surrounding Parishes, will support its own local area network (LAN) of digipeaters (on an assigned frequency), a VHF/UHF BBS and a VHF/UHF gateway. Each LAN will be initially linked state-wide on 145.01.

The LANS will serve specific areas of the State for local communications and 145.01 will serve as the first 'back bone' frequency. Eventually, this will be moved to 440MHz for BBS traffic and 145.01 will remain in place to support LAN-to-LAN communications.

The BTR LAN consists of the Parishes of Pointe Coupee, Iberville, East and West Feliciana, East and West Baton Rouge, Livingston, Ascension, Terrebonne and St. James. The assigned LAN frequency is 145.05. Each Parish can install as many digi's on that frequency as needed. Digi's on the 'backbone' frequency should be limited. LAPRS representatives (listed in last months PRM) can assist other areas in determining which 'major metro area' they are in.

The BBS will be a dual-port with one port serving 145.05 and the other on 145.01. The .05 port will serve users within LAN and forward mail to other LANS inside or outside the State. Likewise, traffic directed to the BTR LAN will be received on .01 and available on to read on .05. Unfortunately, until the 440 'backbone' can be established between BBS's, users will have to share 145.01 with the BBS whenever a user wants to work outside the LAN frequency.

LAN frequencies have been assigned as follows: SHV: 145.07, MLU: 145.09, AEX: 145.03, LCH: 145.07, LFT: 145.09, BTR: 145.05 and MSY: 145.03. Some juggling can be arranged if needed, but clubs or individuals planning to install a digi should check with their LAPRS representative first.

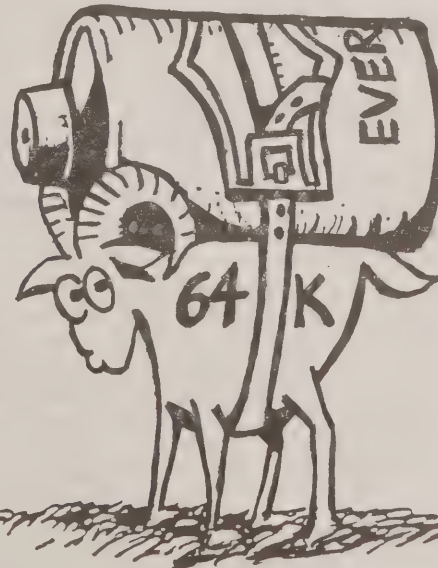
All of these plans will take an awful lot of cooperation amongst LA Hams. So far, each area approached by LAPRS has expressed willingness to cooperate and help. Membership is open to all Hams, or non-Hams, either as individuals, clubs or families. Charter memberships are still available for \$30 and regular memberships for \$12. A charter membership entitles the member to a subscription to this magazine and a LAPRS patch suitable for cap or vest. A regular membership includes the subscription only.

Please forward all the calls of new packet stations in your area to the LAPRS at PO Box 40723, Baton Rouge, 70835. We need all the new 'recruits' we can find. The patches for charter members have been ordered (at SHV hamfest) and should be in in mid-September.

I am filling in for NE5S this month while he vacations in the 'wild west'. Until he lets me do it again, 73 - de Jack, WD5ELJ.

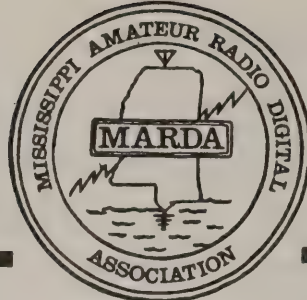
- PRM -

BATTERY BACKED RAM



MARDA

The Official Newsletter of the



MONITOR

Mississippi Amateur Radio Digital Assn.

Patrick J. Fagan - WA5DVV
President - MARDA

JACKSON DIGI:

The good news from the capital is --- Jackson now has a dedicated wide area DIGI on the air! JAN is at a temporary location presently but is able to reach K5HYE in Mendenhall and VKS in Vicksburg. Welcome to Rod, KA5AGD, in Clinton. He has a new AEA PK-232 all mode digital controller on the air. What a way to get going on Packet!

VICKSBURG TO BASTROP:

VKS has a marginal link with BQP in Bastrop, LA at this time but work is being done to improve the path. BQP is on a CATV tower in Bastrop with the antenna mounted on the northwest leg. Coverage to the west and north is excellent but a null exists at the River Town. Minimal power has to be maintained at the digipeater site so as not to interfere with Cable Channel E. Pat, N5BSL, points his beam toward Vicksburg and uses his TNC with an alias of "BSL" to augment the path to BQP. The link is about 50 to 60 per cent in the daylight hours but approaches 100 per cent at night. Listen for new activity from that area very soon.

LAUREL DIGI FINDS PERMANENT HOME:

The Laurel Amateur Radio Club has recently placed LUL at a new site. This DIGI is now 150 feet higher than the former location. Signal reports from the north show an improvement of at least 20 db. That's the good news ... here on the coast the signal seems to be less than the RF level radiated from N5DWU's home station. Sometimes you gain in one direction and lose in another. I guess that is what makes amateur radio such a challenge. LUL was previously operating from N5DWU's QTH in Ellisville. Steve is also SYSOP of the Laurel/Hattiesburg PBBS.

CRESCENT CITY BBS WELCOMED:

Harry is the new SYSOP at the WB5BZE BBS in New Orleans. He is running the WA7MBL software and will be shifting back and forth between 145.01 and 145.03 (New Orleans LAN) for message forwarding. Harry has developed a system for the TAPR TNC-1/ICOM VHF radio combo that will allow a frequency change during a certain predetermined 'window' for early morning forwarding of messages. His system moves from .03 to .01 after midnight and then back again after 6 AM local time. Sounds like a super setup. Maybe we can talk him into writing an article for PRM (HINT - HINT). The addition of the WB5BZE BBS has made a tremendous difference in throughput from the MS to LA area. BBS DXing has been reduced considerably.

PORT CITY PACKET:

The Mobile Amateur Radio Club is just about ready to put on their 440 DIGI. Terry, NN4Y, and Mike, KB4JHU, have been working on this project for quite some time now. Antennas have been installed and a decision is being made on whether to purchase a

commercial two port unit or roll their own. When this system is installed it will complete the initial phase of the MARDA/ALANET backbone link from Alabama to Mississippi. The path from Mobile to Crestview, FL has yet to be improved. A DIGI in between? That looks like the next step. Lets get the dialogue flowing packeteers. Sounds like a joint project that would benefit all the amateur radio clubs in these areas. A shared investment and unified group effort can make it happen!

LIGHTNING STRIKES - DIGI DIES:

K05S-1, the new DIGI in Ackerman has bit the dust. This complete system was installed in a weather-proof housing and mounted at the 800 foot level on a TV tower. Lightning got the computer grade power supply on the first hit. That was repaired and the digi returned to the air. Then lightning made its second attack and glitched the TNC. The Kantronics unit being used did not have a watchdog timer so it locked up on the air. Its difficult to climb a tower to the 800 foot level and reset the TNC in the middle of a thunderstorm. By the time the shower dissipated, the radio transmitter literally burned up. Plans call for the installation of a TNC-2 type unit when the system is rebuilt. We are all sorry to learn of this unfortunate happening. Tower mounted digipeater systems have their advantages but the summer thunderstorms in Mississippi really reek havoc on these electronic marvels.

MCARA HAM/SWAPFEST FEATURES PACKET FORUM:

The Mississippi Coast Amateur Radio Association's annual Ham/SwapFest will be held at Point Cadet Plaza in Biloxi on Saturday and Sunday, October 4 and 5. This will be an outstanding event and a full schedule of activities have been planned. Jon Bloom, KE3Z, ARRL Laboratory Supervisor will be the featured speaker at the Packet Forum and MARDA Statewide meeting at 10:00 AM Saturday morning. This information failed to make it in the HamFest flyer or announcements column in other magazines. Please give it widest distribution so that all will have an opportunity to hear Jon speak. He will also be available after the forum at the MARDA booth. New equipment displays, BBS Q & A session, LAN reports, BACKBONE interfacing with MARDA, ALA-NET and LAPRS, Dual Port TNC progress, and many other topics will be discussed. Over sixty packeteers attended the forum last year and we anticipate double that number this year. If you are within a three state area this is one HamFest you won't want to miss. Make plans to bring the entire family for a weekend vacation on the Coast. Talk-in on 144.73/145.33 repeater.

Until next month, may all your CONNECTS be many and RETRIES few.

- PRM -

FADCA > BEACON

THE FLORIDA AMATEUR DIGITAL COMMUNICATIONS ASSOCIATION

WRITE ONLY MEMORY

Ted Huf, K4NTA

The FADCA Packet Frequency Coordination Committee met at Clewiston, FL on August 24th in the morning before the Network meeting. Committee members present were K4GFG, WB4KGY, K4AHO and K4NTA. It was reported that many of the digipeater operators had not sent in their registrations. The FADCA PFCC is charged with the responsibility for coordination of digipeaters in Florida by the Florida Repeater Council. We cannot do our job without these registrations.

The ARRL filing deadline for the repeater directory is about November 1. The PFCC decided to supply the ARRL with a list containing only those digipeaters that are coordinated (registered), and to list the calls without the area code prefix. If you are a digipeater operator or trustee, please contact FADCA for a registration form and send it in as soon as possible.

I wish to thank our host at the Melbourne Hamfest this year. Packet radio was present with a booth and a spot on the program for a presentation. Howie, N2WX, hosted a panel Q&A session that I think went very well. It was interesting that about half of those attending had never operated packet. There were a lot of questions about how NTS traffic could best be handled and about BBS operation.

PRM

RECEIVED FROM W4NVC VIA PBBS

*** TNC HANG UP ***

FOR THE SECOND TIME THIS WEEK, THERE HAS BEEN A STEADY TONE MODULATED CARRIER ON (03)...EVIDENT THAT SOMEONE'S TNC HAS HUNG UP IN A KEY-DOWN CONDITION... IT SEEMS TO BE HAPPENING TO KANTRONICS ESPECIALLY..I HAVE ONE, AND HAVE HAD MINE HANG UP A COUPLE OF WEEKS AGO...HUNG UP FOR 7 HOURS!

THE TAPR UNITS [AND THEIR CLONES..ED] HAVE A BUILT IN TIMER,...OTHERS DON'T! AFTER DISCUSSING THIS WITH THE KANTRONICS PEOPLE VIA LANDLINE THEY DENY THAT THIS IS A COMMON OCCURRENCE, HOWEVER, THEY DID PROVIDE ME WITH A CIRCUIT FOR A "WATCH DOG TIMER" THAT CAN BE ASSEMBLED FOR COUPLE OF DOLLARS WHICH WOULD GIVE A MEASURE OF PROTECTION (GRIN). I RECOMMEND THAT ANYONE OPERATING A TNC IN AN UNATTENDED CONDITION AS MINE IS MOST OF THE TIME, SERIOUSLY CONSIDER BUILDING UP THIS SIMPLE CIRCUIT.....I'LL BE HAPPY TO PROVIDE ANYONE WITH THE CIRCUIT IF INTERESTED....IT COULD SAVE YOU AN EXPENSIVE MELT DOWN OF FINAL TRANSISTORS AND POWER SUPPLY..

LEAVE MESSAGE ON MY BBS OR KB7TV-1..DE BILL SK

PRM

PACKET AND THE COMMODORE 512

Chuck Harrington, WA4GPF

Yes, it's true! The successor to the C-64 is now available; it was dreamed of and designed by many of the people involved in the original C-64 and VIC20s. Like its predecessors, it is an exceptional computer value. The new 512 computer is affordable, and yet extremely powerful. As its name suggests, it comes with 512K RAM standard. It features a new 68000 32/16 bit CPU running at 8 Mhz, and has a full complement of standard printer and serial ports. Although it won't run your old C-64 software, it comes with a free word processor and other good software to get you started. A packet terminal program is also now available, free of charge, from the author.

Commodore 64 users, please read on! The above paragraph is all true, except for the name of the computer, which is in fact the Atari 520 ST. Many of you C-64 users have not been reading this column, because you saw the word Atari, and since you did not have an Atari, you turned to the next page. Many of us do not have the time to keep up with the happenings in corporate America, and are therefore unaware that Jack Tramiel and some of his best people left Commodore over two years ago and formed "THE NEW ATARI CORPORATION", so that they could continue to develop computers with the value of the C-64.

I was fortunate to be able to exhibit the 520ST running PACK-ET-TERM, my packet specific terminal program for the ST, at the FADCA booths at both the Jacksonville and Melbourne hamfests. Several people came up to the table during those weekends, impressed by the power of the ST and aggravated that they had just spent the equivalent amount of money for a Commodore 128, when they could have had an ST! For those of you who are happy with your Commodore 64s I say GREAT; you have a good value! But I become alarmed when I see people attempting to "upgrade" to a C-128; which may in fact not be too much of an upgrade.

The plain fact is that most Commodore 128 owners are running their 128s in C-64 mode, unable to take much advantage of the 128's additional capabilities. This is because software developers learned a long time ago that it makes more sense to develop their products for the C-64 mode, because then both C-64 and C-128 owners can utilize them. With the reintroduction of the Commodore 64 as the 64C model, Commodore has reconfirmed its intentions to support the C-64, which is in fact Commodore's bread and butter product. This is all fine and good if you are a Commodore 64 owner, but for the C-128 owners, it most likely will mean the capabilities of your C-128

Continued on page 24

FLORIDA NETWORK

COORDINATING MEETING

Clewiston, FL - August 24, 1986

The southern section of the Florida Network Coordination Committee was held in Clewiston on August 24th at Tony's Glades Restaurant.

There was an announcement that Pac-Comm was coming out with a dual port digipeater board. The cost was said to be low. It will be offered in a single port version as well for plain digipeaters. All I/O will be with feed thru. It uses the Zilog 8530 SCC and 7910 World Modem chip. It has no terminal port but you could pull the back cover and plug in a adapter board and a terminal for parameter programming. It will have modem disconnects so that high speed modems can be interfaced later. There will be a CPU watchdog and PTT timer on each radio channel.

Joel Kandel, KI4T, reported that K4TKU is having a hard time getting though Broward County on 145.03. The digi in Ft. Lauderdale is off the air a lot. Henry WA4HXZ is going to try to get one up on 03 in Delray that might help. Henry went on to report that in West Palm Beach W4PHL/WPB is operational at the County EOC on 145.01 and WPB is on 145.03 from a tower in Riviera Beach.

Bob Jankuv, WA2HFA, reported that BCR (145.01) has moved to a better site. They have antenna and some equipment for 220.

A discussion was held about the compatibility with AX25 level 2 dual port digipeaters and N2WX's new software for dual port GATOR 2 switch code. The AX25 Level 3 protocol that Howie is using with the new GATOR software works fine with Level 3, in fact, it uses Level 2.

Tom Kneisel, K4GFG, is working on a new dual port digi using a TNC-2 clone and dual port board from the fellows out in California. It will be at Plantation (PLA). He has the 220 radio, antenna at 60 feet and the two meter radio. Tom also talked about the California version of the KE3Z dual port digipeater software and how the addressing differed from the original. He pointed out that as far as he knew, neither version contained a means for identification like the TNC-2's HID and MYALIAS. The California KE3Z code is available for the TNC-2 with adapter board and the Xerox 820 with FAD Board. The original KE3Z code runs on an 820 with a state machine.

Rick Mixon, KB4CIA, reported that his BBS is off the air until it is replaced with a PC clone. His 820 bit the dust. W4DPH has replaced KC2FF as the BBS for the Tampa Bay area.

Gwyn Reedy, W1BEL, said that TPA is using only a 30' antenna since a storm hit about a month ago.

Jim Diggs, K4AHO, spoke on activities in the Orlando area. The Orlando Amateur Radio Club has agreed to support a 220 digipeater located at Lake Wales. The Lake Wales site is an excellent one with a commanding "view" of Central Florida. It is

expected that this site will link the East and West coast of the state. Jim says to look for Lake Wales to be on the air in late October. He reported that Orlando is still using 05 with a digi and dual port bbs. Jim's BBS observes quite hours from 7-11pm on 01 but is available all of the time on 05.

The next meeting of the Network Coordinating Committee, Southern section will be in Stuart on the third Sunday of January.

- PRM -

ELT SEARCH MISSION

Joel Kandel, KI4T

On Saturday morning August 23rd, two meter packet radio played an important role in locating an emergency locator transmitter (ELT) in the Florida Keys.

KI4T in Miami received a telephone call from K9CQ, a Civil Air Patrol officer, informing him that the Search and Rescue Satellite (SARSAT) had heard a beacon on 121.5 somewhere in the vicinity of Sugarloaf Key. He asked KI4T if he could reach Key West on packet, 150 miles distance, and ask the amateurs down there if they could monitor 121.5 and to verify the beacon.

A single digipeat through PTK in Plantation Key connected KI4T with K4OFG in Key West. K4OFG is the telecommunications officer for Monroe County.

K4OFG called Key West Center, who requested commercial airliners overflying Key West to listen for the beacon. The name and phone number of the Key West fixed station operator was sent via packet to KI4T who relayed it to K9CQ.

A Coast Guard plane was dispatched and the ELT was soon located in a small plane sitting on the Sugarloaf Airport runway. A faulty switch on the ELT had set it off.

This incident points to another valuable use for packet radio. The accurate transmission of names and phone numbers as well as the ability to link and digipeat across large distances makes it a perfect tool for search and rescue.

- PRM -

SYSOP MEETING

The FADCA TAMPA LAN is hosting a meeting of packet BBS SYSOPS in conjunction with the Florida Gulf Coast Amateur Radio Council Hamfest held in St. Petersburg October 18th and 19th. The meeting will be held at 0900, Sunday October 19th in the seminar area of the hotel. The LAN will provide free tickets to the traditional Saturday evening hamfest dinner for all participating SYSOPS.

- PRM -

FOR SALE

Kantronics KPC-2400 used less than one hour. Mint condition with warranty card. \$275
Andy, KC2FF (813) 796-3477.

FIRST COAST

AMATEUR PACKET ASSN

Jack Driskell, KB4B

The second day of the Greater Jacksonville Hamfest, August 10, marked the end of the charter membership period for this northeast Florida, southeast Georgia packet group. With five new members joining up at the hamfest, the total is now 23. A very active packet booth manned by FADCA and FCAPA folks got plenty of attention at the hamfest. Bob, WD4BIW, FCAPA president, seemed to be talking almost nonstop. Chuck, WA4GPF, demonstrated his triple split screen packet terminal program for the Atari ST. Very impressive. Ted, K4NTA, Gwyn, W1BEL, George, WA4BRF, and Chuck, WA4GPF, were among the more distant travelers.

With packet gear for sale at several of the commercial booths, several new calls were heard before the weekend was out. Ed, K4YNK, Red, N4KBD, Larry, AA4JI, Mike, N4EPD, Mike, NF4L, and Rob, AA4JH were among the new calls printed.

Facilitating operations in the JAX LAN we now have JAX-1 as a centrally located digipeater at the American Red Cross HQ on Riverside Avenue. The new digi is working fairly well but some antenna and feedline improvements are still in order. JAX-1 will make it easier for stations around town to reach 904JAX which is about 25 miles west of town.

Many of the packet people went to dinner at Ryan's Steakhouse where discussions were lively and varied. Another contingent of packeteers opted for seafood and headed for Red Lobster. Topics of conversation included FCAPA budget, now only \$50 in the hole, virtual terminal formats, binary transfer protocols, and real time versus BBS type packet operations.

This last topic warranted considerable discussion. There seems to be a growing tendency for packet operations to favor BBS type contacts over real time connections. It is clear that bulletin boards have brought a considerable convenience to the mode, but many of us greatly enjoy the fun and excitement of talking to someone live. Bulletin board messages are great when you cannot reach the operator you want to talk to, but it is something like calling someone's house and reaching an answering machine. The answering machine will facilitate communications but cannot replace the two way real time conversation. One case in point is the use of bulletin board systems in Georgia through the middle of the state. A year ago it was possible to connect from Jacksonville to Atlanta with fair conditions. Today it is hard to tell that anyone is in Georgia, except around Augusta and Savannah.

The Georgia LANs are accessible through bulletin board gateways only. The bulletin boards allow connects on the network side only from other bulletin boards. Although someone in one of these Georgia LANs can connect to someone else via gateway, anyone outside of the system can only send a BBS message, no real time connect is possible. Perhaps all of this is a temporary measure to serve as a stop gap before more sophisticated linking is

established, but we miss seeing those Georgia calls here in the Jacksonville area. Bob, WD4BIW, among others, has reached as far as Lynchburg, VA using Savannah and Augusta as digipeaters.

Many of us spend most of our working time doing something with machines, it will be a shame if our packet time becomes more oriented toward machines than people.

- PRM -

NEWS

FROM THE MELBOURNE LAN

Bill Newkirk, WB9IVR

Florida winners of a scholarship granted by the Foundation For Amateur Radio, College Park, MD, are: -- Dade Radio Club Tropical Hamboree Scholarships (\$500) -

David R. German, N4FAD, Sarasota, FL

Todd E. Wiggins, KB4BDK, Marianna, FL

-- Edwin S. Van Deusen Memorial Scholarship (\$350) -

David P. Tancrell, KB4GIA, Palm Bay, FL

Area Code 305 will be split into 2 areas in April 1988. The area around Miami/Ft. Lauderdale will continue to be area code 305. The remaining area will become known as area code 407. This was necessary because Southern Bell was running out of phone numbers. The change is expected to handle the regions growth until the turn of the century.

- PRM -

AIR FORCE MARS ON PACKET

Steve, N4GXX/AFA2WG

The authorization of packet radio operation is limited to TVRS frequencies (advance techniques nets) except 6-meter 49.98 MHz. Packet is also allowed on simplex VHF frequency 143.950 MHz, providing the frequency is currently cleared and authorized for use.

- PRM -

NOTICE

TAPR TNC-1, AEA PKT-1, and Heath HD-4040 owners. Version 1.1 of the 'WA8DED' packet software is available, and Ron Raikes, WA8DED, has corrected some minor bugs from version 1.0. Just send a set of EPROMS and some return postage to: John Moore, W5HUQ, 548 Clermont Ave. S., Orange Park, FL 32073.

- PRM -

PACKET VOICE NETS

Florida State-Wide - 3958 kHz Sunday 8 AM

Southnet Coordination Net - 7190 kHz Sunday 2 PM

Tampa Bay Area - 147.165 MHz Sunday 7:30 PM

Brevard County - 146.850 MHz Sunday 8 PM

Please drop K4NTA a message with corrections or additions

ICOM IC-22S FREQUENCY COVERAGE MODS

Elmer A. Wingfield, W5FD
26 Belmont Drive
Little Rock, AR 72204

The ICOM IC-22S Phase Locked Loop synthesized FM amateur transceiver covers 146-148 MHz in 15KHz increments. This radio may be made more useful for amateur packet radio users by a simple modification to change the frequency coverage to 145-147 MHz so that it will operate on the popular packet simplex frequencies of 145.01 - 145.09.

All that is necessary is to change the X2 local oscillator crystal from the present 44.563333 MHz to a frequency of 44.230000 MHz. The crystal is a third overtone type and is located on the VCO/PLL board. After installation of the new crystal, the frequency should be trimmed by adjusting C38 to give a transmitter output frequency exactly one MHz less than the programmed value. A good frequency counter should be used for this adjustment. This applies to either the VIP switch frequencies or the original IC-22S switch diode matrix programmed frequencies. The duplex or simplex or VIP-15 or VIP-600 switch operations remain the same as before modification.

The local oscillator output frequency to the IC4 mixer will be 132.69 MHz after the new 44.23 crystal is installed, one MHz lower than the original 133.69 MHz. The VCO output frequency to the IC4 mixer will be 1 MHz lower for the same N divider count, and the transmitter output frequency will also be 1 MHz lower ($F_{out} = VCO + 10.7 \text{ MHz.}$) Although the VCO operating frequency is shifted 1 MHz lower it has not necessary to adjust the L7 VCO slug in either of the two IC-22S units that have been modified. Should PLL lock fail in the range of 145-147 MHz then set the programmed frequency as near to the new frequency of 146 MHz ($N = 174$, old frequency 147) as possible and adjust the L7 slug to center the PLL lock-in.

If desired, the Q17, Q18 and Q19 trimmers may be readjusted for maximum power output using an in-line or terminating wattmeter to a 50 ohm dummy load. C100, C87, C92, C91, C85, and C81 are also to be peaked for maximum power output.

I used a crystal for this modification from International Crystal Mfg., Inc., 10 North Lee, P.O. Box 26330, Oklahoma City, OK 73126-0330. It was part number (code number) 471260, 44.230000 MHz, 3rd overtone for use in ICOM IC-22S Q7 local oscillator circuit, and the cost was \$11.00 postpaid. I recommend this crystal source because their experience in providing these crystals to me make it more likely that the crystal you receive will adjust to the required frequency. The crystal supplied is a commercial grade unit.

It would be possible to install a crystal socket at the X2 position and use a plug-in crystal to allow easy return of the radio to its original condition (or to make future modifications easier.) If you take that route, change the code number on your order to 471270 and include the rest of the information given above.

See the diagram for the diode matrix N count versus frequency relationship before and after modification.

X2, ORIGINAL = 44.56333 MHz, 3rd OT

Band coverage 146-148 MHz

$$f_1 = 3 * 44.56333 = 133.69 \text{ MHz}$$

$$N = \frac{f_0}{.015} = \frac{144.39}{.015} \quad f_0 = 144.39 + .015N$$

X2, modified = 44.23 MHz, 3rd OT
Band 145-147 MHz

$$f_1 = 132.69 \text{ MHz}$$

$$N = \frac{f_0}{.015} = \frac{143.39}{.015} \quad f_0 = 143.39 + .015N$$

$$f_0 = VCO + 10.7 \text{ MHz (operating freq.)}$$

$$f_2 = 1.62 \text{ to } 3.60 \text{ as } N = 108 \text{ to } 240 \text{ (both)}$$

$$f_2/2N = 7.5 \text{ kHz to PLL Detector/Filter}$$

- PRM -

News and Views continued from page 14

TAPR has established an associate membership which does not include the PRM subscription for those who receive the publication from another source. I highly recommend continuing support of TAPR.

FADCA has not established an associate membership class. Dual TAPR/FADCA members are encouraged to retain FADCA membership and associate TAPR membership, thus continuing to support both organizations. The rates charged for supplying PRM to participating clubs include a small amount to compensate for the loss of FADCA renewals because of the transfer of memberships to the local organization.

The PRM concept of a common club publication is designed to strengthen and support the growth of regional organizations. If there is a participating club in your area, join it and you will be supporting both local and national groups. If your local group is not participating in PRM, make them aware of the opportunity at the next meeting.

ARTICLES

Good quality photographs and articles are needed on a regular basis to make an interesting magazine. Please send your contributions to the FADCA address. Good thorough reviews of packet equipment and software are needed. I prefer reviews that emphasize facts and direct experience with a product. It takes a lot of homework to learn enough about a product to give it a proper evaluation. Reviews in some magazines tend to tell more about the bias or lack of experience of the author than they do about the product. I sure don't mean to scare any potential contributors away, but we are not looking for 'pan jobs.' Manufacturer's new product announcements will be published for your information, and will be identified as such.

- PRM -

PACKET RADIO MAGAZINE QUICK INDEX

January 1986

"A Briefcase Station" - Portable packet using Radio Shack model 100 and TNC-2

"Model 100 / TNC-2 Clock - A Timely Program" - use the Model 100 to reset your TNC's system clock.

"SAREX-II Test Flight" - Report on a test of software that was to be used on an upcoming shuttle mission, test took place over Florida in private airplane.

"Gator-2 is Here!" - A report on working networking software written by Howard Goldstein, N2WX

"Gator-2 PAD Survival Sheet" - How to use the network switch.

"Using the IC-27/37/47 on Packet" - Tips on how to pull clean audio unsquelched from the discriminator.

"Plug in TNC for PCs" - HAPN TNC on a plug in card for your IBM PC or clone, what it is and how to get.

February 1986

"PAK-COMM Version 1B: A Review" - product review on a terminal program.

"File Transfer Protocol For Packet Radio" - from the packet data library on Compuserve.

"What is a Packet ?" - An introduction to packet, learn what is in a braaaaaaap.

"Florida State Packet Digipeaters" - A centerfold !

"1985 FADCA > BEACON INDEX" - Index to another years worth of good packet info.

March 1986

"Model 100 Terminal Program For GLB-PK1" - prevents the problem of keyboard interrupts interfering with packet reception, written in BASIC.

"More on 85-105" - A rundown of PR Docket No. 85-105.

"Pictures" - Another centerfold ! Photos of Fifth ARRL Amateur Radio Computer Networking Conference, see the faces behind the names of many articles published in packet publications.

"What's in a Layer ?" - beyond level 3 networking

"A Proposed Level 3 Routing Algorithm" - More on level 3 networking

April 1986

"Steam Powered Packet Radio" - Packet on a choo choo

"Notice To All TAPR/Clone HF Packet Users" - How to improve HF packet reception.

"Auto Answer For the TRS-80 Model 100" - a BASIC program for the Model 100, a mini BBS mailbox system.

"What's in a Layer ?" - the saga continues... why layer 3 is not linking.

"BBS Compatibility" - The transition from Xerox based WORLI to PC-clone based WORLI code.

"Dual-Port Digipeaters, K9ng Modems and FAD Boards" - Lots of good info on FAD boards, 9600 bps modems and Midland radio mods.

May 1986

"EZ-Packet 80: A Review" - A review on a terminal program for the TRS-80 Model 1,III,4.

"A Bare Bones Dual - Port Digipeater" More on multiport digipeaters and how they relate to networking.

"Cactus Corner" - Although in every issue, this month Lyle Johnson gives a frank review of the many different TNC's on the market.

"Computer Networks" - Forget what's in a layer, what the heck is a layer, this is where you can find out.

"Review of the AEA HF Packet Modem, Model PM-1" - The title says it all.

"Southnet" - What is it, where is it, who is it?

"Connect - The Beginners Column" - Just the basics needed for first timers or a reminder for old-timers, gets you on and off WORLI BBS system.

June 1986

"Cactus Corner" - A look at the new Kantronics PK-232 2400 bps modem.

"Computing Across America with the Winnebiko" - an interesting look at a high tech bike that sports a packet radio station.

"Atari 520ST" - A new column dedicated to the Atari 520ST

"Eliminating POOP from Packet" - Probably needs no introduction, this article has been around.

July 1986

"Homebrew Packet" - Progress report on several on going software projects of Howard Goldstein, N2WX

"Packet on the Atari ST" - More on the Atari 520ST.

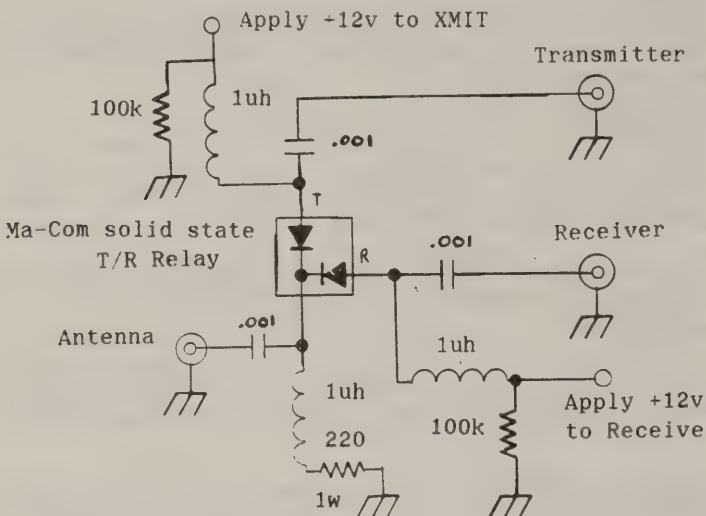
"WORLI Work-alike for the C-64" - Information on a new BASIC program for the C-6 that operates almost like a WORLI BBS.

Continued on page 24

PIN DIODE SWITCH FOR RELAY SWITCHED RIGS

Jeff King, WB8WKA
Reprinted from Packet Express

The following circuit will keep your relay switched rig in pace with your TNC. The circuit can be used to replace the relay in your rig. This will improve packet turn-around time by a great deal.



PRM Index continued from page 23

"Connectionless Emergency Traffic System" - A realtime message delivery system for use under emergency conditions, written for the C-64.

"TNC-2 Dual Port Digipeater" - How to make your one TNC-2 act like two TNCs.

"Computer Networks" - This is a continued discussion of what a layer is.

"Packet Beeper for TNC-1 Clones" - A connect status indicator circuit.

"Bouncing Packets off the Moon and Other Topics of Lunacy" - EME and packet for those who like to step beyond.

August 1986

"Cactus Corner" - A NNC update and more on 2400 bps packet.

"Packet and the Atari ST" - A review of PACK-ET-TERM, a terminal program for the ST.

"An Update on the Connectionless Emergency Traffic System" - Updates and corrects a previous article on CETS.

"Frequency Agile C-64 BBS" - More on the WORLI look alike BBS written for the C-64.

"Hamilton Area Packet Network Notes" - HAPN has been running tests with 4800 baud on 145.65, read this and find out what's going on.

"Kantronics TNC Mods to Improve Packet Copy" - How to fix the push to talk circuit of the KPC so it doesn't interfere with your Icom HT or solid state relay type rig.

- PRM -

Back issues of PACKET RADIO MAGAZINE and its predecessor the FADCA > BEACON are available from FADCA. Volumes one and two of the BEACON (1984 and 1985 respectively) are \$8.00 each postpaid or \$15.00 for both. PRM issues one and two (JAN and FEB 1986) are \$2.00 each while supplies of the second printing last, and issues three and later are \$1.50 each. Back issue orders are generally shipped within 4 weeks after receipt.

- PRM -

Commodore 512 continued from page 19

computer will not be supported by developers. It is for these reasons, I request that you C-64 users take a close look at the Atari ST computers, before you decide to trade your C64s for C-128s.

The 520 ST is in the price range of the Commodore 128, and can offer the C-64 owner a chance to really upgrade to a very powerful and flexible computer system. The fact that you will need new software, need not be the major consideration; free software fills the memory banks of the ST phone BBS systems, and you will soon have all kinds of software that is far superior to the old stuff you left behind. Also, many of the professional developers who previously wrote for the C64, are now developing for the ST, and there is a wide variety of commercial software products available today!

Among the free programs available is PACK-ET-TERM, which is now being distributed in version 3.1a. It was found that version 3.0 BETA, would not properly run on the one megabyte STs, and so I have made the first upgrade to the program. PACK-ET-TERM 3.1a comes in two versions, one customized for TNC-1s running the WA8DED software, and a TAPR version. You may obtain a copy of PACK-ET-TERM by sending a check for \$4.00 to cover the cost of the disk and shipping to: Chuck Harrington, 5634 Lesser Drive, Orlando, FL 32818. You may also call the McDonald Development BBS at (305) 886-1632 and download the files. The FADCA software library currently has no way to duplicate ST disks, so unless you can get a copy from a friend or BBS, I am your best source.

I enjoyed meeting and talking with many of you at the hamfests, and would like to thank you for your ideas and support of PACK-ET-TERM. I am interested in hearing from users regarding any problems that they have experienced with PACK-ET-TERM, and shall appreciate any suggestions I receive for improving the program. Also, my special thanks to Bob, WD4BIW, and Howie, N2WX, for the help and hospitality given me at the hamfests.

Next month, a look at the ST and other possible applications for it in packet radio. Until then, may your Retries be few!

- PRM -

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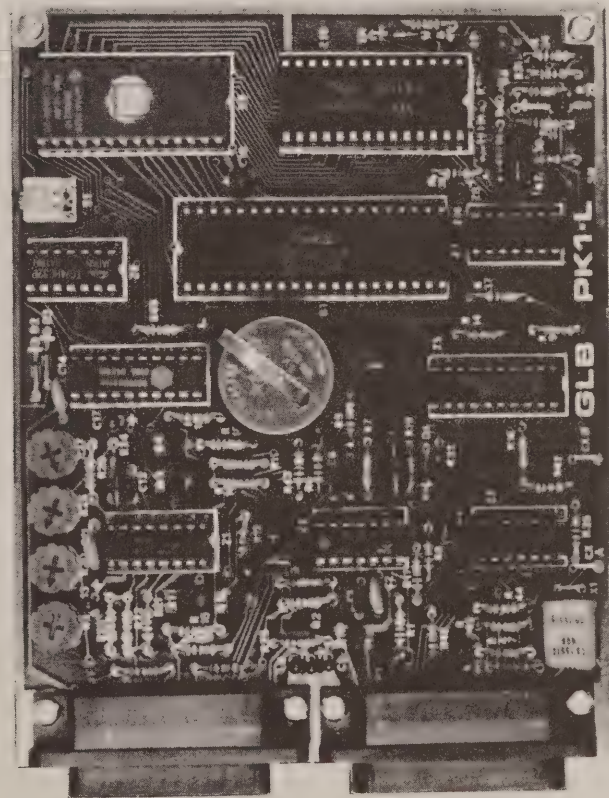
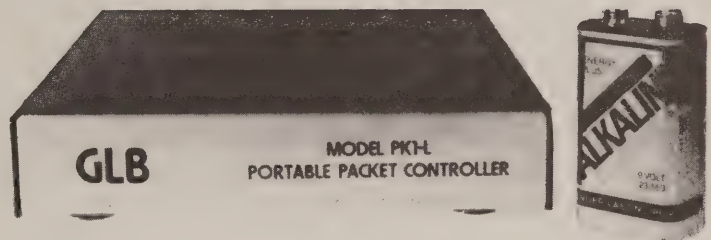
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Second, Computer Compatible

It doesn't matter what kind of computer you have, we have a Pakratt for you. The PK-64 works with the popular Commodore 64 or 128, and the PK-232 works with any other computer or terminal that has an RS-232 serial port. The PK-64 doesn't require any additional programs. Simply connect to the computer and transceiver and you're on the air. The PK-232 needs a terminal or modem program for your computer. The one you're using with your telephone modem will work just fine.

Fourth, AEA Quality and Price

Not many manufacturers like to discuss quality and price at the same time. AEA thinks you want high quality and low price in any product you buy, so that's what you get with the Pakratts. Ask any friend who owns AEA gear about our quality. The people who buy our products are our best salespeople. As for price, the PK-64 costs \$219.95, or \$319.95 with the HF option. The PK-64A, an enhanced software unit with a longer flexible computer cable, costs \$269.95 or \$369.95 with the HF option. The PK-232 costs \$319.95 with the HF modem included. All prices are Amateur Net and available from your favorite amateur radio dealer. For more information contact your local dealer or AEA.

Prices and specifications subject to change without notice or obligation.

PAKRATT™ Model PK-64



PAKRATT™ Model PK-232

Third, Performance and Features

The real measure of any data controller is what kind of on-air performance it gives. While the PK-64 and PK-232 use different types of modems, both give excellent performance on VHF. The optional HF modem of the PK-64 uses independent four-pole Chebyshev filters for both Mark and Space tones, and A.M. detection. The HF option can be factory or field installed.

The PK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The internal modem automatically selects the filter parameters, CW Fc=800 Hz, BW=200 Hz; HF Fc=2210 Hz, BW=450 Hz; VHF Fc=1700 Hz, BW=2600 Hz.

The PK-64 uses on screen indicators to show status, mode, and DCD (Data Carrier Detect) while the PK-232 uses front panel indicators. Both units use discriminator style tuning for HF operation. And that's just the tip of the iceberg. Features like multiple connects on packet, hardware HDLC, CW speed tracking, and other standard AEA software features are included in both the PK-64 and PK-232.



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PACKET RADIO MAGAZINE

Dedicated to the Advancement of Packet Radio

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- Two radio ports
- 7910 single-chip modem
- 300 and 1200 bauds
- Enhanced command set
- Multi-color status LED's
- Supports RS-232 and TTL computers
- Active HF bandpass filter
- Tuning indicator option
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The TNC-220 has the familiar TAPR command set and AX.25 Level 2 Version 2 protocol running on a Z-80 processor with 32k bytes of EPROM and 16k bytes of battery-backed RAM. A Zilog 8530 SCC performs all packet HDLC in hardware. The terminal port can select either RS-232 or TTL for your C-64/128, VIC-20 or other TTL computer. Five large, color-coded LED's clearly indicate status at a glance. The power switch is now located on the front panel. The TNC-220 is enclosed in a rugged extruded aluminum cabinet with an attractive two-tone blue front panel. All indicators and controls have large clear labels.

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 - KE3Z Dual-Port Digipeater
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Amateur Net Price Schedule

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DR-200 DUAL-PORT

Both digipeaters use a Z-80 processor which has up to 32k bytes of EPROM and two JEDEC sockets for 2/8/16/32k bytes of battery-backed RAM. Packet HDLC operations are handled in hardware by a Zilog 8530 SCC. Both use the AMD 7910 LSI modem chip. Each modem channel has a standard disconnect header and time-out timer. The CPU itself has a hardware watchdog timer and external hard reset line. The circuit board is RFI shielded by our extruded aluminum case. All connections are soldered to feedthroughs.

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Subscriptions to PACKET RADIO MAGAZINE are available through any of the participating organizations listed below. See individual club pages in this issue for information on how to contact these organizations. If there is no participating group in your area, you are encouraged to join FADCA or TAPR. FADCA membership dues (US Dollars): United States = \$15.00, Canada = \$18.00, Foreign (airmail) = \$25.00. Three dollars of each member's dues is allocated for FADCA operations, and the remainder is for the subscription to PRM. Major clubs wishing to participate in PRM should contact the FADCA office.

PARTICIPATING ORGANIZATIONS

ALA-NET - Alabama Packet Radio Association
CAPRA - Chicago Area Packet Radio Association
FADCA - Florida Amateur Digital Communications Association
GRAPES - Georgia Radio Amateur Packet Enthusiasts Society
KCAPRG - Kansas City Area Packet Radio Group
LAPRS - Louisiana Amateur Packet Radio Society
MAPRC - Mid-Atlantic Packet Radio Council
MARDA - Mississippi Amateur Radio Digital Assn.
PPRS - Pacific Packet Radio Society
PTG - Packet Technical Group (Detroit area)
RMPRA - Rocky Mountain Packet Radio Association
TAPR - Tucson Amateur Packet Radio Corporation
UPRA - Utah Packet Radio Association

CAPRA MEETING SUMMARY

Compiled by Steve Goode, K9NG

At the November 8, 1986 meeting of CAPRA, it was reported that the wire wrap HDLC board for the clubs 68000 network controller is nearly complete. Code is being written to drive this HDLC board.

Five members who own IBM PC compatible computers were given copies of the TCP/IP code obtained from Phil Karn, KA9Q. These members will begin on the air tests of this code in order to check it out before converting it to the club 68000 controller.

The club is awaiting delivery of a Pac-Com dual port digipeater. This will replace the digipeater at N9ATM-2 allowing connection of the 144.95 MHz LAN to the experimental 220 MHz 9600 bps radios. WB9MJN will place a second TNC on 220 MHz at 9600 bps to allow operation of the WB9MJN RLI BBS on either 145.01 or on 144.95 MHz via the dual port digipeater. The dual port digipeater will also allow members with 220 MHz 9600 bps radios to operate a LAN directly on 220 MHz.

The following members were nominated for offices within CAPRA:

Director: Larry Thompson, W9MSW
Treasurer: George Dorner, W9ZSJ
Secretary: Dick Gulbrandsen, WD9DBJ
Vice President: Don Lemke, WB9MJN and Jerry Werner, WB9WBN
President: Steve Goode, K9NG

Jerry Werner, WB9WBN, has volunteered to chair a committee in the Skywarn net to examine the use of packet within the net. Skywarn is a 5 county emergency weather network activated to report tornado sightings when conditions for tornado formation exist.

The program for the meeting was given by Larry Thompson, W9MSW. He described operation of the TCP/IP code for the PC for those in the club who obtained copies and will begin on the air tests. He also described how the TCP/IP code may operate when placed in operation at N9ATM-2.

- PRM -

Please submit your articles and photographs dealing with any aspect of digital communications for publication in PACKET RADIO MAGAZINE. Both technical and operational topics are desired including new product announcements and equipment reviews, cartoons, anecdotes etc.

=====

A printer's gremlin placed the MARDA heading over the MAPRC page in the October issue. I apologize to both organizations and to all PRM readers for the error. ed.

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RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
1/2" Alum	50	.3	.5	1.2	2.2
1/2" Helix	50	.2	.4	.9	1.6
1/2" Helix	50	1	.2	.5	.9

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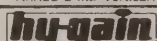
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TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AV0 20-10 mtr vertical	
14 AV0 40-10 mtr vertical	
18 AVT/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2 mtr Beam	
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BICYCLE ODDYSSEY OF A HIGH-TECH NOMAD

(Computing Across America, Chapter 1)
Steven K. Roberts, HtN. (WORDY)
Columbus, Ohio

Computing Across America - what's this? A collection of articles about eccentrics with micros? Tales of satellite socializing? Computer industry forecasts written in academic third-person boring?

Heh. Anything but. Did you ever want to break the chains that bind you to your desk and just take off, wandering the planet while making a living doing whatever it is you love the most? Seems reasonable enough... and three years ago I did just that. Since then, I have been living in an electronic cottage on human-powered wheels, and through this column I'm going to share my adventures with you.

Yes, we'll be covering the burning issues of the day: Adventure, love, danger, weird people, radical extremes of network living, fulltime travel, high-speed flights down mountain roads mottled with Aspen-shade, mycological tone poems, unexpected ice caves, bizarre contraptions, ham radio, satellites, a 200-pound bicycle worth \$100 a pound, real-life wizards, regional humor, outlandish microprocessor applications, ridiculous comments, random controversy, moments of pure anguish, and so much fun that something about it **must** be illegal. For starters.

I am an agent of future shock -- a high-tech nomad, a pedal-pushing freelance writer head over heels in love with that sweet piece of asphalt known as The Road. My home, if I can be said to have one, is Dataspace; my vehicle, the Wondrous Winnebiko. My computer is a Hewlett-Packard Portable PLUS. Yes, I work for a living: my business is to have a wildly exciting life and then tell people about it.

(It's a lousy job, but someone's gotta do it.)

This is the first of a series -- a collection of tales too strange to predict and too diverse to summarize -- an ongoing travelogue of a romantic high-tech bicycle odyssey. As I move into the second 10,000 miles of this open-ended journey, I have switched electronic networks and suddenly find myself in a whole new community. (Why should I restrict my nomadics to **physical** space? Howdy, neighbor.)

So lemme settle in here and take an angle-bracketed <sip> of compu-booze, then tell you a story...

The First 10,000 Miles

In September of 1983, I sold my 3-bedroom ranch home in Midwestern Suburbia and moved to an 8-foot-long computerized recumbent bicycle bedecked with solar panels and enough gizmology to start a science museum. I quickly discovered that this was not to be just another bike tour. Using CompuServe as my link with the universe, I maintained a full-time freelance writing business while pedaling a 9,760-mile journey around the United States.

I lived for the moment -- and it had many. During the 18-month adventure, I fell in love both on- and off-line, encountered a band of convicts in the Maryland woods, sailed through the Gulf of Mexico, tempted fate more than once, and learned more than I could have ever imagined. I overheated in West Texas, froze my ass in Utah, discovered Key West hedonism, and explored the California mystique. In Santa Fe, I saw firsthand the symbiosis between hawker and gawker; in Crested Butte, I witnessed a community so close that everybody's biological cycles are synchronized. I ate crawfish, oysters, and GORP -- I prowled the country seeking the exotic, sexy, and bizarre. The stories flowed like hot breath, and soon the media turned its unblinking eye on me as a high-tech curiosity, a peripatetic eccentric, a symbol of freedom. "Charles Kurault on a bicycle," gushed one local TV station as I pedaled into a perfect cliché of sunset.

And I came to realize, looking back into the eyes of all those people looking wistfully at me, that the greatest risk of all is taking no risk. I noticed (once I stopped trying to score new states) that if you think too much about where you're going you lose respect for where you are. And I dedicated myself to resolving the classic trade-off of freedom versus security -- a task I think I've finally accomplished.

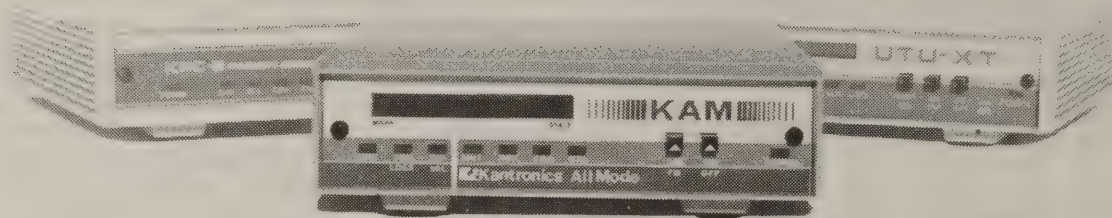
Ah, and the people. When you look like something out of a nonviolent version of "The Road Warriors," you tend to open a lot of doors. Even if most of them turn out to be closets, the numbers are there: I spent months probing the asymptotes of America and finding brilliance in the **oddest** of places. I found communities ranging from the vaporous to the ancient, and was tempted time and again by their seductive tug. And I glimpsed the potential of life online, a life outside the strictures of physics, beyond the limits imposed by image and prejudice. In the electronic pub, brain meets brain and conversation ranges from the bawdy to the sublime.

Life aboard the Winnebiko is a life of extremes. I am at once a being of cloud and soil, satellite and bicycle -- living two simultaneous lives. One is visceral, sweaty, attuned to every hill and headwind -- the other is ethereal, intellectual, an electronic interlocking of imagination and communication. Something about the contrast casts both aspects into sharp relief, and I suppose I've become something of an online proselytizer.

9,760 miles. The journey wound down a year ago in the frenzy of approaching book deadline -- along with the exhaustion of some 2.5 million pedal cranks and over 200 different beds. (Time for the commercial: the book is called **Computing Across America: The Bicycle Odyssey of a High-tech Nomad**. It's being published this fall by Learned Information.)

Anyway, the bicycle sat dormant for a few months in a Silicon Valley attic, then found its way back to the land of its origins for six months on the operating table. And that brings us (far too quickly) to today.

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RMPRA > PACKET

The Official Newsletter Of The Rocky Mountain Packet Radio Assn.

DATELINE:

THE CONTINENTAL DIVIDE

Bob Gobrick, WA6ERB
President, RMPRA

THE GOLDEN SPIKE WEST - As reported by Steve WOGUZ in the September 1986 RMPRA>PACKET quarterly magazine and the October 19 issue of Gateway, digipeater links were established from the Colorado Front Range into the Salt Lake area spanning the Great Rocky Mountains (or as flat-lander Packet Pete Eaton, WB9FLW, would say those illegal mountain towers). The path held up for a good two months until late autumn storms hit Colorado and Utah resulting in lightning hits taking out WORRZ-1 (Black Ridge, Colorado) and WB7WAB-1 (Blue Mountain, Utah/CO). I remember a talk that Lyle Johnson, WA7GXD, gave at the Wyoming Hamfest where he referred to the special August 86 73 Magazine Packet issue with all of the packet articles and a few minor articles (not packet related) on "Lightning Never Strikes" by WOWUZ. Well as we are now all aware in the Rocky's, lightning is a major concern when you put up 10,000 foot digipeaters. Work is now ongoing to reestablish these sites, but the task will not be easy with the logistics of getting four wheel drives up into those snow covered areas.

THE GOLDEN SPIKE EAST AND WEST II - mean while, back in the flatlands, major work was achieved in linking Nebraska and Wyoming into the Colorado Front Range. With a herculean effort by Jim, KA3IDN, Keith, W7ZAC in Wyoming and Gary, AGON in Western Nebraska a very solid link has been established. This work has inspired a major burst of activity all across Western Nebraska and Wyoming. Reports are now coming of accesses from the digi's at W7ZAC (Casper), W7KMF-1 in Dubois, Wy and KA7SHX-1 in Kemmerer (western Wyoming) of links into Salt Lake. Can it be that the Golden Spike across the Continental Divide is really going to be won by the Cowboys of Wyoming? The December issue of the RMPRA>PACKET quarterly magazine will report on the detailed activities of these links.

THE GOLDEN SPIKE SOUTH - Central New Mexico has been quite active with two HF/VHF Gateways on KN5D and K8BI-1 and two VHF only PBBS's on KA5BEM and KD5VV. Still the elusive link into Southern Colorado has not been established but the gang is planning a major digi on the 11,300 ft. Mt. Taylor (remember the lightning protection).

AMSAT AND PACKET - I've just returned from the annual AMSAT Symposium, hosted by the Dallas AMSAT gang and it was some kind of show. One thing I noticed was the amount of packet talk that was being carried on in the satellite community (no strange coincidence when you consider you have guys like Tom, W3IWI, Phil, KA9Q, and Harold, NK6K, serving on both the AMSAT and TAPR board of directors). From the Rocky Mountain area I ran into active satellite packeteers Dave, WDOHHU, (the voice of the Sunday

AMSAT International net) and Jack AAOP. Some quick briefs:

- Tom, W3IWI, had in tow the Alpha version of the Fuji Oscar 12 modem which TAPR hopes to have ready by their annual meeting in February. Tom's unit was impressive, incorporating features of the modified JAMSAT circuit in the August 86 QEX magazine with added goodies of digital AFC to track for doppler shift, LED "bar graph" tuning indicators, plug compatible TNC-1 and TNC-2 hookups and finally a PSK modulator (for packet weak signal experiments) in addition to the Manchester type FSK modulator needed for FO-12. Tom also had with him the unstuffed AMSAT UK FO-12 TNC modem designed by G3RUH (the board is immediately available for you satellite packet enthusiasts who can't wait).

- AMSAT PHASE IV PLANNING - the "hot" topic of the symposium was the future Phase IV synchronous satellite planning. A major component of this next generation of satellites will be the heavy use of earth stations centered around packet gateways. Since the cost of a launch of this nature will be a major magnitude greater than anything AMSAT has done before, creative ways are being explored to raise the necessary funds. One very attractive aspect of the packet gateway approach is the use of the packet satellite system during emergencies. This has appeal to many public service groups and the FCC who is very interested in how ham radio can serve the public. Be prepared to see the future of ham radio change before your eyes.

- Automatic Az/El Antenna Control for Packet stations: For those of you who have operated through FO-12 you are probably well aware of the "extra hands" that you need to tune the up and down links, position the azimuth and elevation antennas and finally operate your key or PTT. Compound this with future 10 finger (or is it two finger) keyboard activity and you'll realize the increase of nervous breakdowns among the satellite packeteers. Well Frank, WB5IPM, has just what the doctor ordered. Frank had with him a finished prototype of a design that will appear in an upcoming QEX article that allows a Tandy Model 100 (or any computer with a parallel printer port) to automatically drive your az/el rotors (Kenpro's in Franks station) for tracking. Using a Basic program based on the W3IWI tracking program, Franks contribution will be a big step forward in automating stations for packet use (and the design will use mostly easy-to-get RS parts).

WA7MBL SOFTWARE - The Rocky Mountain area is anxiously waiting the 3.04 release of Jeff's WA7MBL PBBS software. Steve, WOGUX, in Rifle, Colorado will be one of the Beta testers. The new version is rumored to have support for up to six TNCs with on-screen indexing, enhanced forwarding file capabilities, and enhanced machine language file transfer features. Jeff also has in the works a new version

DATELINE - continued from previous page.

of his shareware program YAPP (IBM packet terminal program) that will mate with the PBBS software for machine language transfers and DoubleDos support. There are still a number of bugs to be worked out depending what the next version of TNC-2 code looks like, so Jeff would appreciate that all requests be held until the Beta testing is complete (the Beta testers have all been selected). Distribution announcements will be made by the normal channels (Compuserve Hamnet TAPR section) and Wes K7PYK will be handling the distribution details.

KISS TNCs IN THE ROCKYS - Colorado is planning on being one of the hot beds of the next level of packet networking. Bdale, N3EUA, and Andy, NOCCZ, are Beta sites for testing KISS TNC code as reported by Phil Karn, KA9Q, in the October issue of PRM. Although for most packeteers the use of digipeaters and AX.25 code may seem the ultimate, this layer of communications is just at the beginning rung of the packet networking ladder. A possible form of future amateur packet networking protocol (TCP/IP) may consist of converted TNC-2s and bare bones MS-DOS computers sending and receiving IP datagrams in connectionless AX.25 frames. We will be reporting more on this development in the next issue of the quarterly RMPRA>PACKET and here in PRM. Bdale, N3EUA, has the latest code available on his ham/swl FIDO computer BBS at 303-593-0766 for packeteers interested in seeing what it's all about.

- PRM -

"SPOKEN" PACKET

FOR THE VISUALLY IMPAIRED

Ted Black, WBOTSX and Kevin Utter, N7GES

Reprinted from the RMPRA>PACKET, Vol. 1, No. 3.

The voice synthesizer is a great invention that can turn silent print on a screen or printer into an open window of communications with a computer or terminal. When connected to a packet radio system, the voice synthesizer makes it possible for a blind amateur to use packet radio with ease, and enjoy the power of this mode of communications.

Kevin (N7GES) owned an ECHO GP voice synthesizer that he had used with his computer - why not hook it up to his TAPR TNC-2 and see, and rather hear, what would happen. Hooking it up meant manufacturing a "Y" cable so that both the ECHO GP and the TRS-80 Model 100 could share the terminal connection on the TNC-2. Only three lines were connected between the ECHO and the TNC-2; pin 1 (optional protective ground), pin 3 (receive data) and pin 7 (signal ground). The remaining lines were not connected to avoid any undesirable interaction between the Model 100 and the ECHO.

Much to my amazement when we powered up the system, the ECHO faithfully recited the TAPR start up message. If you are not familiar with a voice synthesizer, your first experience can be a little unnerving, and its interpretation of a packet radio QSO will be downright entertaining. For instance, it attempts to pronounce everything that it receives - call signs and ham radio jargon included.

The synthesizer has made packet radio operation much easier for Kevin, but he still resorts to his optacon to "read" the Model 100's display when the spoken words are missed (his ECHO does not have a repeat feature). Another operational problem that hasn't been solved is flow control. It is possible to overflow the ECHO's buffer and send it into "babble mode"; that overflow is most likely to occur when downloading messages from the BBS. Kevin uses manual XON/XOFF from the Model 100 when it sounds like overflow may occur.

This is obviously not intended to be an in-depth study of synthesizers or their application. Kevin and I just wanted to make other packeteers aware of our successful experiment. We would welcome your comments, questions or suggestions and we have much more specific information available for the asking. Please mail your requests to WBOTSX at 124 Fishback Ave., Fort Collins, CO. 80521 or N7GES at 1353 Sunset Drive, Wheatland, WY 82201 - a S.A.S.E. would be appreciated.

-PRM-

SHAKING HANDS WITH YOUR TNC

Peter Stone, KOVLD

Reprinted from the RMPRA>PACKET, Vol. 1, No. 3.

If you are using a TNC which connects to your computer via an RS-232 link, then at one time or another you have probably wrestled with the problem of setting up the correct 'handshake' or 'flow control' with your TNC. The need for flow control can be easily understood by thinking of the data flow from your computer as water flowing into a 'bucket' which is the TNC's buffer. The TNC removes 'water' from the 'bucket' as it sends packets out on the air. If your computer sends data to the TNC faster than the TNC can send the data out on the air, the 'bucket' will eventually overflow and some of the information your computer is sending will be lost. Flow control solves this problem by giving the TNC a way of telling the computer to stop sending for a while when its buffer is close to full. After the TNC has 'lowered the water level' enough, it signals the computer that it may again begin sending data. Remember also that characters flow from the TNC to the terminal and flow control will be required in this direction also.

Flow control problems are unlikely to show up during a normal packet QSO because most people don't type fast enough and for long enough to fill the TNC's buffer before the TNC can empty it. Going the other way, most computers can display information presented to them faster than the TNC can send it so the computer's buffer never overflows and loses characters. A flow control problem is usually very evident, however, when your computer sends a long file to the TNC. Since the computer can type much faster than the TNC can transmit the typed characters, the TNC's buffer will quickly fill up and unless the TNC can tell the computer to stop sending until there is more buffer space available, characters will be lost and the transmitted file will be garbled. If you are logging incoming information to your computer's disk, the computer will have to be able to tell the TNC to wait while it periodically writes the incoming information to

SHAKING HANDS - continued from previous page.

its disk. Without flow control in that direction, the file you record on your disk will be garbled.

TAPR TNCs and their clones (as well as most others) utilize either of two methods of flow control: hardware flow control or software flow control.

HARDWARE FLOW CONTROL uses two additional wires besides the required transmit, receive and ground in the RS-232 connector. One of the wires is used by the computer to signal the TNC that it is safe to transmit data. The other one is used by the TNC to signal the computer that data may be sent. To properly utilize hardware flow control you will also need to make sure that your computer is configured properly to send and receive the necessary flow control signals and that the cable between TNCs and computer has the proper wires connected to the proper pins. Since different TNCs and computers may use different pins for these signals, you will need to carefully read the manuals for your equipment to be sure both the computer software and the TNC are configured for hardware flow control and that the interconnecting cable is wired properly so these signals appear on the proper pins at both the computer and the TNC ends. Hardware flow control is enabled in TAPR TNCs by setting XFLOW OFF.

SOFTWARE FLOW CONTROL uses special characters inserted in the normal character stream to start and stop the flow of information over the RS-232 link. The two characters normally used for software control are XON and XOFF. XON is the character sent when you hold down the control key on your computer and simultaneously strike the letter "Q". XOFF is generated by holding the control key and striking the letter "S". When using software flow control, the TNC monitors its receive line while it is transmitting. When the computer's buffer is almost full, the computer automatically sends an XOFF character to the TNC. When the TNC sees the XOFF, it stops sending data. When the computer empties its buffer and becomes able to accept more characters from the TNC, it will automatically send an XON character to the TNC. The TNC then sees the XON and resumes sending characters to the computer. Thus by sending XOFF and XON characters, the computer is able to start and stop the flow of information from the TNC so no information is lost. The TNC is also able to send XOFF and XON characters to the computer and thus regulate the flow of data the other way. The advantage of software flow control is that it does not require additional hardware or wires in the connecting cable to regulate the data flow. Its main disadvantage is that because XON and XOFF are transmitted right along with the data in the character stream, there is no way for the receiving device to know whether the XON or XOFF it sees are meant for flow control or whether they were simply part of the data that was being transmitted. This is not a problem with normal text since XON and XOFF are non-printing characters and they will never be present in a normal text file.

To utilize software flow control in TAPR TNCs you must set XFLOW ON and define the following: START \$11, STOP \$13, XON \$11 and XOFF \$13. START and STOP define the characters which will start and stop data

flow from the TNC. XON and XOFF are the characters the TNC will use to start and stop data flow from the computer.

It is very important when using flow control that both the TNC and the computer are set up to use the same form of flow control. If they are not configured properly, some very strange and puzzling problems may result. One which I have encountered, occurred when a friend had his TNC configured for hardware flow control but his computer was configured for software flow control. While he was downloading a file from my BBS (with my TNC and BBS computer configured for software flow control), his computer told his TNC to stop by sending an XOFF but since his TNC was configured for hardware flow control, it interpreted the XOFF as just another character to be sent out in a packet. His TNC kept right on sending and his computer missed some of the data in the file he was downloading. Meanwhile, when the XOFF his computer sent was received by my BBS computer, the computer immediately stopped sending since it assumed the XOFF was a signal from my TNC. Since my TNC didn't send the XOFF, it wasn't about to send an XON to the computer. The result was that both the computer and the TNC were waiting for each other with neither willing to speak first. I had to re-boot the computer to get things going again. The end result was that my friend's file was garbled and my BBS had mysteriously died. The problem was difficult to diagnose because the XOFF which caused all the trouble is not a printing character, that is it doesn't show up on the screen and thus there was no obvious way to determine why the BBS wasn't responding. After several mysterious crashes with no apparent cause, I was finally able to figure out what happened by borrowing an RS-232 protocol analyzer from work which enabled me to see even non-printing characters and thus discover what the problem was. For those practical jokers of you out there who may want to try this experiment for yourself, I have since switched to hardware flow control on the BBS so stray XOFFs won't crash the BBS again.

-PRM-

RMPRA MEMBER NOTE: As a reminder, please check your mailing label for expiration of your RMPRA membership. If you have any corrections please contact the RMPRA membership chairman Norm Miller, NOENN.

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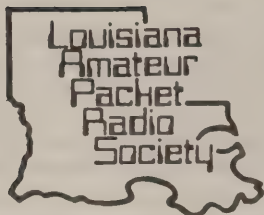
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- PRM -



The Official Newsletter of the LOUISIANA AMATEUR PACKET RADIO SOCIETY

How about getting someone to do a Southnet column? I think it would be a worthy cause...

We have good news and we have bad news...the good news is that the long awaited LAPRS patches have finally arrived! The bad news is that PACKET is spelled PACHET! So back they go...maybe Santa will bring us the right ones.

I attended the Southnet meeting in Montgomery, AL and sent the report to all LAPRS directors in the state. It seems to have reached all corners via packet, but if you have not seen it, please let me know. As a matter of fact, I would like to know even if you did receive it. This is one way I can judge the effectiveness of the system and find out where improvements are needed.

Speaking of improvements, thanks to KD5SL and the gang in Baton Rouge, the link between BTR, Slidell and points east is now a rock solid 100%. Thanks guys, we really needed that!

A few phone calls around the state reveal that activity has levelled off a bit. LAPRS continues to grow, however, with a membership of 40 at the end of October. 25 of these are charter members, so to me, this means a real commitment to packet radio. Now is as good a time as any to spread the word about packet. LAPRS has a good supply of VHS and BETA cassettes on packet. These are the TAPR tapes by Pete Eaton. They are well done and run about 30 minutes. A video presentation and a live packet demo make an excellent club meeting program. Please contact NE5S or WD5ELJ for additional information.

One of the most popular packet activities is Bulletin Board operations. You can send and receive not only personal mail, but computer programs and pictures. WD5ELJ has a super set up with an AT clone and a 20 megabyte hard disk, and it really works well. Others make do with Commodores and some others are forced to do without. LAPRS would like to help get a BBS started in each major metro area. IBM PC's and clones are really dropping down in price. A new bare bones system can be put together for about \$600-700. A hard disk will add another \$400. This is a bit steep for an individual or a small club to justify, but if 10 people can come up with a \$100, the job is done!

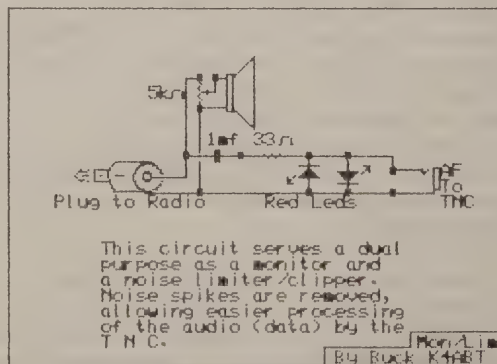
I have started collecting bits and pieces of PC's. If someone upgrades to a color monitor, larger hard disks, a new keyboard or disk drives, I'm usually right there begging for it. If you have resources or sources for such items, please let me know. Perhaps we can come up with a few workable systems and get someone up and running with a good BBS.

Rumor has it that WA7MBL already has, or is about to release, a new version of his BBS software. This is the IBM-PC version of the original WORLI BBS. LAPRS has BBS software for Xerox 820, IBM, and Commodore, so if you have a need, get in touch with one of the LAPRS directors listed below:

1. Shreveport Metro
Jerry Thompson KA5EWC
3035 Boone St.
Shreveport 71108
316-635-6537
2. Monroe metro
E. Benson Scott AE5V
Rt.4 Box 232A
West Monroe 71291
318-396-2424
3. Alexandria metro
Guy Navarro WD5GIV
3716 McCann Dr.
Alexandria 71302
318-445-5815
4. Lake Charles metro
Sam Nelson WA5VDM
3307 E. Napoleon St.
Sulphur 70663
318-527-3481
5. Lafayette metro
Danny Griffith Jr. K5ARH
123 Normandy Rd.
Lafayette 70503
318-989-9039
6. Baton Rouge metro
Jack Coffee WD5ELJ
10026 Hackberry St.
Baton Rouge 70809
504-293-4764
7. New Orleans metro
Emile Alline Jr. NE5S
773 Rosa Ave.
Metairie 70005
504-834-6444

Stay connected....de NE5S

- PRM -



Packet Status Register

NOVEMBER 1986 # 23



Tucson Amateur Packet Radio Corporation

PRESIDENT'S CORNER

Lyle Johnson, WA7GXD

CompuServe

TAPR is now "officially" on CompuServe.

The TAPR CompuServe ID Number is 76246,565. We will be found on HAMNET in Section 7.

The TAPR office account, usually handled by me, although others will be using it from time to time, is for business (ordering, inquiries, etc.) as well as technical questions of a general nature.

Let me emphasize general.

If you are having a problem hooking a TNC up to a TI-99/A computer and it loses every 27th character, asking for a solution to the TAPR account on CompuServe will probably not get you very far.

If, however, you want to know about HF modems, or OSCAR 12 operation, it may be an appropriate place to ask.

When making ANY inquiries, however, please leave your full name and mailing address. We have a tight budget, and it is usually cheaper to reply via US Mail. This is how ALL specific inquiries and orders will be handled.

This past month I have been very busy with the NNC digital and modem boards, the FUJI modem project, HF modem testing and a digital radio project.

NNC Update

I am pleased to report that the NNC hardware is functioning well with 32k-byte RAM chips, allowing it to run a RAMdisk for faster software development. Dave and Chris in Salt Lake have been busy wave-soldering modem boards, so the Alpha sites should have these in hand by the end of the month.

Howie Goldstein has a re-entrant HDLC interrupt handler running on a TNC 2 for use on the NNC.

Richard Green is busy debugging the hardware and software associated with the SCSI port.

Phil Karn reports that his C-code for TCP/IP is too large to compile and run in the NNC environment unless someone knows of a C compiler that can handle the expanded memory capability of the HD64180 processor.

Other Alpha developers - let me hear from you!

FUJI MODEM PROGRESS

As reported elsewhere in this issue, TAPR is undertaking a project to make a 1200 baud PSK modem available for use with FUJI/OSCAR 12's Mode JD packet mailbox.

Tom Clark, W3IWI, has been doing some extensive testing and refining of the design, with inputs from other interested parties. Layout work is being handled by Jack Davis, WA4EJR, and Tom King, KA6SOX, building on previous work done by Chuck Green, NOADI.

If all goes according to schedule (it won't), full prototypes should be operational by early December, with deliverable kits in the very-early 1987 time frame.

Now, don't call the office to place your order yet!

Prices have not yet been determined, and no names will be placed on any waiting list until we are certain that we have a reproduceable kit.

Next month we should have more details for you.

HF Modems

See "Beginner's Corner" in this issue. I hope to be able to report on side-by-side HF testing comparing PLL and filter modems, as well as PLL vs. single-chip modems next time.

Digital Radios

Steve Goode is working out some preliminary designs on a 56 kbps radio, and there are several efforts on to get a 9600 bps radio going. There is even an effort to make a 1200 bps fast-switching radio..

Until next month, happy packeting! (and try 21.097 on 15 meters for some pleasant HF packet QSOs...)

- PRM -

PSX--- TAPR's Packet Software Exchange

IBM-PC and MS-DOS

PAK/UNPAK

\$5 postpaid

This is a program for sending binary files between computers. Submitted by KA9AKM.

So far, this has been the only response to the call for PSX software. More titles will be added as you submit them to us!

- PRM -

BEGINNER'S CORNER: MODEM DESIGN

Lyle Johnson, WA7GXD

The great debate rages on. Filters forever! Slicers never lie! PLLs work better! Get "true DCD" only with this design! Software DCD for HF operation!

Just what are the differences between filter-type and phase-locked-loop (PLL) modems? Why use one type over the other? Is one definitely superior?

If these, or similar, questions have aroused your curiosity, this article may help you decide which type of modem works best for your applications. At the least, it may help you sort out the various claims made by different advertisers.

MOs

The modulator (mo?) of most 300 and 1200 bit-per-second (bps) modems used in Amateur packet radio usually consists of a phase-coherent audio signal varying between two frequencies. (Phase coherent simply means that the signal switches cleanly between the two tones without clicks, thumps or other glitches.)

The most common modulator is the XR2206, which has the advantage of low cost, and the disadvantage of requiring calibration.

The next most common involves digital synthesis, often by lookup tables in a ROM. This has the advantage of not requiring tone calibration; however, post-filtering of the signal may be needed. A post filter may be as simple as a series resistor and shunt capacitor (L-network low-pass filter). And the relative complexity of this approach is often buried inside a single chip, or a small part of a single chip.

Either approach works well.

DEMs

The big difference lies in the demodulator (dem?).

The PLL units most often employ the XR2211. Again, this is a very low cost device that requires calibration. It works, however, and works pretty well.

The filter-type units typically employ two groups of op-amp filters with passbands centered around the two tone frequencies of interest. A "slicer" compares the relative amplitudes of the two channels and indicates which is the stronger of the two.

A third approach is sometimes taken using a digital signal processor to analyze the incoming information and make the decisions. Some single-chip modems use this approach.

Which is best? It all depends...

If the data you want to recover is typical RTTY, running at 45 bps and using a tone split of 170 Hz (or 850 Hz), a filter type modem is probably going to work the best, and a PLL probably will work the worst.

"Aha! Then the XR2211 is a bad idea for HF and I should trade in my TNC for a filter unit?" No, I didn't say that.

Consider the signal to be processed. At the slow data rate of 45 bps, the incoming signal will "dwell" on a particular tone for several cycles. At the common RTTY tones of 2125 and 2295 Hz, we will dwell on one tone for at least 22 mSec, or more than 5 cycles at the low tone. This gives the filter system plenty of time to settle down, meaning we can use pretty sharp filters. A spectrum analyzer looking at the RTTY signal might show a pattern like this:



What we see is a lot of energy concentrated around the two tone frequencies, and virtually no energy in the space between them. The wider the shift (or the slower the data rate), the more apparent this becomes.

Now, as you increase the data rate, the space between the two tones begins to fill up with signal energy (information) and we have to widen our filters or suffer the consequences.

In this case the consequences are labelled "intersymbol distortion." Don't let the phrase bother you. If you have ever tried to listen to an SSB conversation with a sharp CW filter in line, you had a hard time understanding the words. Intersymbol distortion. Or maybe you heard ringing with a too-sharp (or overdriven) filter. This is also a form of intersymbol distortion.

It seems logical that at some point, there must be a data rate where the space between the two tones would fill up fairly uniformly and we would see a pattern something like this:



The peak amplitude is less, and the signal is broader. This results because there is less time per bit sent, so the energy per bit goes down. There is no free lunch; we need more margin for this faster data.

But a PLL demodulator can be set up to recover the information in this type of signal very efficiently. And this can be done quite easily.

Remembering the dwell time, at 1200 bps using a 1200 Hz low tone, we have only 1 cycle time in the worst case to base our decision. And the decision must be made much faster than one cycle (0.8 mSec) so we don't have a lot of "jitter" on our decoded signal going to the TNC (which has plenty of other chores to handle without being fed jittery data).

Oh, yes! The magic rate for reasonably flat response and easily decodable signals requires a shift of 2/3 the data rate in bps. Thus, for 300 baud HF operation, we want a shift of 200 Hz (sound familiar?) and 800 Hz for 1200 baud. Wider shifts (1000

Continued >>>

Hz at 1200 baud) reduce the intersymbol distortion further, but at the expense of additional bandwidth.

Of course, a filter-type modem can be set up to handle this 2/3 shift type of signal, too. The question becomes one of whether the PLL is any better, or any worse, than the filter modem. And that one is just plain hard to call. It depends a lot on the circuit used. And how well the operator understands the limits of the modem.

In Tucson, Eric, N7CL, with a little help from his friends, is conducting some very careful tests and measurements using a TNC-2 clone for the PLL and an AEA PM-1 for the filter unit. I hope to be able to bring you some results of that testing next month. It should prove VERY interesting...

DCD

Data Carrier Detect (DCD) is a signal fed to the TNC from the modem that tells the TNC that a signal is being received. This may not seem too important, since the TNC is getting data and the FCS will help a lot in separating data from noise, but it is more important than that.

Most of us have half-duplex radios. We can send data, or we can receive it, but not both at the same time. So, the TNC checks to see if the channel is busy before it transmits.

The simplest way to do this is by way of the DCD line. If the modem suspects that there is a valid signal coming in, it tells the TNC to hold off transmitting.

This is an area where PLL modems hold a definite edge.

Most modems were designed for telephone use. In most countries, when you have placed a phone call, the line is pretty quiet when neither party is talking. In radio terms, we would say there is a good signal-to-noise ratio.

So, most filter modems and single-chip modems use a circuit that simply looks for audio energy within a certain band of audio frequencies. If the energy level is above a certain amount (threshold), the DCD line is set and the TNC doesn't transmit.

Now, listen on a packet channel and open your radio squelch. Pretty loud? An FM receiver generates a lot of noise when no signal is present; this is the OPPOSITE of a telephone.

Thus, most filter and single-chip modems have a fairly useless DCD output when it comes to packet radio use.

Of course, you can use your squelch.

Unfortunately, most radio squelch circuits are very ssslllloooooowww. They can cut your radio turnaround time down by 50 to 100 mSec (some radios take over 600 mSec to turn around, and the squelch is a big part of the reason). This impacts your data transfer rate on the packet channel, and makes you more likely to collide with another station's transmission.

The situation isn't much different on HF. Unless you set your audio and RF levels very carefully, you will get excessive DCD falsing. And this will cause your TNC to hold off a lot, causing the other station to retry unnecessarily.

A PLL demodulator, on the other hand, is less concerned about signal levels. It is trying to locate a coherent signal in all that audio energy. It is continually trying to lock on. If the DCD filter is set up correctly, there will be an amount of delay in the DCD output to ensure that the PLL has been locked onto a signal long enough for it to be considered a true tone instead of simply noise.

WHAT TO DO?

As you can see from the above discussion, the lowly PLL demodulator in your stock TAPR TNC isn't too shabby, especially for radio use. When properly operated, it can give good performance in HF as well as VHF applications.

The key to success is careful setting of the audio input signal to the PLL.

A future article will give details on settings to use. This article should give you some background in understanding why the settings will be what they are.

Stay tuned!

- PRM -

NEW SOFTWARE FOR THE TNC-2 (AND CLONES)

Howie Goldstein, N2WX, is at it again! He has prepared a new release of software for the TNC 2 to utilize the new 32k byte RAM chips. This results in bigger buffers.

The price of the new CMOS RAMs has dropped from \$120 last year to \$20 today!

TAPR has the new chips in stock and expects to have the 1.1.4 software release available for shipment by the 20th. As this is written, the software is being tested, so delivery may slip.

Then again, we may be on time!

See the price list in this PSR section for details.

- PRM -

RENEWAL REMINDER

Please check your mailing label on the front cover of this issue of PRM. If you are a TAPR member, there will be a number in the center of the top line. It indicates the month and year of your membership expiration.

If your expiration date is 02-87 or earlier, please take a moment to renew.

Don't put it off, or you may miss an issue or two of PRM and PSR!

- PRM -

Tucson Amateur Packet Radio will be holding its annual meeting during the weekend on February 21 and 22, 1987.

Your Board of Directors plans to meet all day on Friday, the 20th.

Friday night activities will include the traditional Pizza gathering, followed by racing at the Malibu Grand Prix.

Saturday, the Theatre Royale at the Embassy Suites Airport Inn (formerly Granada Royale) is reserved from 9 AM through 5 PM. The day's activities will include presentations from packeteers from various areas on numerous subjects. As in previous years, a catered lunch will be served.

Saturday night, we will gather at the Triple-C Chuckwagon Ranch for an old-fashioned western meal and entertainment.

Sunday morning the Theatre Royale is again reserved from 9 AM until 1 PM. This is to allow more and better presentations during the meeting.

The early afternoon adjournment should provide ample time for folks to drive home or catch a plane from Tucson International Airport.

More details will be published as the big weekend approaches. If you want to speak, contact the TAPR office and let us know so we can begin planning early.

See you in February!

NOTE: Since the Board will meet on Friday, all voting must be done by mail. No ballots will be accepted at the annual meeting, so those of you accustomed to procrastinating until then will be finding yourselves disenfranchised! Please vote in a timely manner, using the ballot that will be found in your January PSR.

- PRM -

CONNECT INTERNATIONAL

The Radio Society of Great Britain (RSGB) has launched a brand new newsletter devoted entirely to Packet Radio. "Connect International" will run about twelve pages monthly. Delivery outside Europe will be by air mail.

Content will cover a wide range; full length technical articles, discussions on packet hardware, software, protocols, networks and standards, digipeaters and packet switches, mailboxes, news and views, bugs and fixes, beginners column, reference documentation, packet operation, special interest groups, international packet register, satellite and emergency data communication, plus a truly international coverage with up-to-the-minute news of activity and developments from packet groups and individuals throughout the world

The following price list is current for November, 1986.

Memberships:

Associate (no PSR/PRM)
\$5.00/year
Full (PSR/PRM included)
\$15.00/year in the US
\$18.00/year in Canada
\$25.00/year elsewhere

Accessories:

HF Tuning Indicator Kit
\$25.00 postpaid in the US
(see October 1985 PSR for circuit)
FUJI/OSCAR 12 PSK Modem
To Be Announced
9600 baud Modem Semi-Kit *
\$25.00 postpaid in the US
(see K9NG article in 4th ARRL Proceedings)
FADPAD Xerox 820 Adapter *
\$25.00 postpaid in the US
(PC board and data only)
LSC-10 Coffee Mug
\$5.00 (only at Hamfests!)
(and the Annual Meeting...)

* These products are for experimenters and are neither complete nor supported by TAPR.

Education:

Introduction to Packet Video
\$10.00 postpaid in the US
(available in VHS format only)

TNC 2 Software/Hardware:

TNC 2 Software Upgrades
1.1.3 uses 16k RAM
1.1.4 requires 32k RAM chip
\$12 postpaid
Reprogram your EPROM
\$2 plus postpaid return mailer
32k byte RAM chip, low power, 150 nSec
\$20 postpaid

OEM Packages:

TNC 1 OEM package
\$500 one-time charge
TNC 2 OEM package
\$5,000 one-time charge plus royalties

In addition, we stock spare parts for TNC 1 and TNC 2 units. Call or write for your specific requirements.

- PRM -

"Connect International" will be edited by Ian Wade, G3NRW, the well-known compiler of the "Data Comms" feature in Radio Communication and will be produced and circulated by the RSGB.

Be among the first to receive this exciting new publication. Please write to RSGB Headquarters to subscribe to the new publication. Enclose payment with your application. Funds should be in pounds sterling. North American rates: £6.93 for the first nine issues.

RSGB, Lambda House, Cranborne Road
Potters Bar, Hertfordshire, England EN6 3JE

PRM -

NOMINATIONS ARE NOW OPEN

It is that time of year again. Now that your TV screen is clear of the usual mud-slinging, acrimonious political advertising, it is time to consider something really important. I am referring to your TAPR Board of Directors.

As you probably know (but some of you newer members may not), TAPR is governed by a fifteen-member (15 -count 'em! That's more than General Motors!) Board of Directors. Each Director serves a term of three (3) years, and, due to staggered terms, one-third of the Board, or five (5) Directors, are elected every year.

The current Directors' terms expire as follows:

Mike Brock, WB6HHV Feb 1988
Tom Clark, W3IWI * Feb 1987
Pete Eaton, WB9FLW * Feb 1987
Andy Freeborn, NOCCZ Feb 1988
Steve Goode, K9NG Feb 1989
Eric Gustafson, N7CL Feb 1989
Skip Hansen, WB6YMH Feb 1988
Lyle Johnson, WA7GXD Feb 1989
Scott Loftesness, W3VS Feb 1989
Dan Morrison, KV7B Feb 1988
Margaret Morrison, KV7D * Feb 1987
Harold Price, NK6K * Feb 1987
Bill Reed, W0ETZ Feb 1988
Gwyn Reedy, W1BEL Feb 1989
Pat Snyder, WA0TTW * Feb 1987

Nominations are now open for the seats expiring February, 1987 (marked with an asterisk - *).

Any member of TAPR may nominate any member for the Board.

TAPR MEMBERSHIP APPLICATION

Tucson Amateur Packet Radio Corporation
P.O. Box 22888, Tucson, AZ 85734

Name: _____

License
Callsign: _____ Class: _____

Address: _____

City &
State: _____ ZIP: _____

Home Work
Phone: _____ Phone: _____

If you wish to have any of the above information not be published in a membership list, indicate the items you wish suppressed: _____

I hereby apply for (**select one**) full / associate membership in Tucson Amateur Packet Radio Corp. I enclose \$15.00 (full) / \$5.00 (associate) for one year's membership dues. I understand that \$10.00 of my dues (full members) are for subscription to the PACKET RADIO MAGAZINE (PRM). Associate members do not receive any publication. The entire amount of

To place a name in nomination, just send a letter to the TAPR office with the name of the person you wish to nominate (including yourself, if you like). It would be helpful if you would also provide us with your nominees telephone number and any qualifications you think your nominee has for the office.

We will then get in touch with him (or her) and obtain the person's direct consent to run. At that time we will ask for a statement from the nominee for publication in PSR. (We won't print your picture, so don't let that stop you!)

"What is required of a Director?" you ask.

A Director is expected to attend the Board of Director's meeting and TAPR Annual Meeting in February of every year in which he (or she) holds office. The meetings are held in Tucson, and TAPR does not reimburse expenses for this trip. This means, depending on where you live, a commitment of a few hundred dollars per year.

The Board of Directors reviews the previous year, establishes goals, elects the Officers, and generally guides the organization.

The schedule for this term's election process is as follows:

Event	Time
Request for Nominations	November 1986
Deadline for Nominations	December 15th, 1986
List of candidates and ballot	January 1987

So, submit the name of someone you think will do a good job and get it in to the TAPR office today!

- PRM -

the associate membership dues and \$5.00 of the full membership dues go to support TAPR's research and development activities in packet radio. My signature indicates that I desire to become a TAPR member, and subscribe to PRM (full members only).

Signature: _____ Date: _____

The Tucson Amateur Packet Radio Corporation is a nonprofit scientific research and development corporation. The corporation is licensed in the state of Arizona for the purpose of designing and developing new systems for packet radio communication in the Amateur Radio Service, and for freely disseminating information acquired during and obtained from such research.

The officers of the Tucson Amateur Packet Radio Corporation are:

Lyle Johnson, WA7GXD President
Pete Eaton, WB9FLW Executive VP
Heather Johnson, N7DZV Secretary
Terry Price, N6HBB Treasurer

Tucson Amateur Packet Radio Corp.
P.O. Box 22888
Tucson, AZ 85734
(602) 746-1166

FADCA > BEACON

THE FLORIDA AMATEUR DIGITAL COMMUNICATIONS ASSOCIATION

WRITE ONLY MEMORY

Ted Huf, K4NTA

I have operated a packet radio BBS for a long time at this QTH. My first was using my brand new TNC Beta board, now know as a TNC-1. The BBS ran on a R/S Model 3 and was converted from a landline BBS. About a year and a half ago I converted over to a Xerox 820 and the famous WORLI MailBox.

Time passed and I was able to upgrade my computer to a XT Clone sporting 640K, 20 meg hard disk and turbo board. Boy what a machine! Now with Double-Dos I could even do two things at once.

Well there was nothing else to do but switch over to the BBS written for the IBM PC (MS-DOS) by Jeff, WA7MBL, out in Utah. Jeff did a fine job on his BBS software, but, I think that he wrote it based on a very early version of the WORLI software and it did not have many of the nice features of WORLI 11.6.

Much is going on right now in the packet BBS software world. Hank, WORLI, and his helpers are working a new version of the WORLI MailBox written in the C programming language. As it is written in C, it should be portable to any machine for which there is a C compiler. Rumor has it that it will be ready for release in the first quarter of 87.

Jeff, WA7MBL, is about to release his new 3.0 version that has been rumored to support TNCs on as many as four serial ports and allow simultaneous connects on each of the ports. As far as I know, Jeff's software will still only run under MS-DOS.

The development that I really wanted to tell about this time is a program done by Peter Stone, KOVLD for the IBM PC.

Peter's program called an emulator is a CP/M emulator that runs under MS-DOS on an IBM PC or clone. One of the programs called CPM.COM is the CP/M emulator which will allow you to run programs written for CP/M and the 8080 or Z-80 CPU.

The other called WORLICPM.COM handles the special changes made by Hank to the operating system on the Xerox 820 for his software.

CPM.COM even be used to assemble and link the macros that make up the WORLI program using M80.COM and L80.COM but running on a PC. The emulator does run a lot slower than a CP/M program running in its own environment on a Z-80 machine.

The nice thing about running the WORLI software again is having the source. I have modified my 11.6 so that it will skip over the "hit any key" line and go to the menu for the sysop when he first starts up the system and go right to the [A]uto answer mode. The

clock in the WORLI software is loaded by the emulator from the PC system clock which in my case is battery backed up so there is no problem in using a AUTOEXEC.BAT to bring the BBS on line in the event of a power failure.

I don't know who is set up to distribute this software so I will not mention Pete's address here. I will copy it for any who wants it if you send me a formatted (360K) 5-1/4 disk in a self addressed and STAMPED mailer.

Last month in PRM a list of WORLI type BBSs were listed. I had something to do with the updating of the list which I got via packet from another BBS. Well, I don't know how I did it, but, I managed to edit my own BBS right off the list! Just to set the record straight, K4NTA is still around on 145.01 and 145.03 from Stuart, FL. HI!

Seventy-three and happy packeting until next time.
- PRM -

** FADCA is coordinating our digipeaters in Fla. **
** If you are planning to put up a digipeater, **
** contact FADCA at 812 Childers Loop, Brandon, **
** FL 33511 for registration forms. **

FADCA PACKET FREQUENCY COORDINATING COMMITTEE

Tom Kneisel, K4GFG

FADCA's PFCC held a meeting in Ocala on November 1. It was held in conjunction with the Northern section of FADCA's Network Coordinating Committee.

The PFCC is reviewing a packet bandplan for six meters which would utilize 50.62 to 50.78 paired with 51.62 to 51.78 Mhz, with channels on 20 Khz spacings. The frequency of 51.70 would be for packet simplex and 50.70 (which is the national RTTY frequency) is excluded from the plan. If you are interested in 6m packet and have any comments on this plan, the PFCC would like to hear them.

Information for the next ARRL Repeater Directory is being compiled. If you are a digi trustee, you will receive a note in the mail showing how your digipeater will be listed. The PFCC will be listing only those digipeaters which have registration forms on file with us.

The inputs will go to the ARRL on Dec. 1. After consulting with K4LPT from Crestview, the PFCC revised the two meter packet bandplan to change Tallahassee and Crestview to 145.09, and to add more frequencies for the Panhandle. The plan was given final approval and adopted as shown below. See May or July PRM for additional details.

Continued >>>

The Motorola Amateur Radio Club in Plantation received coordination on 145.05 for a gateway digipeater to link Naples into the East coast 220 Mhz backbone. They proposed to use high power and high gain antennas horizontally polarized on 145.05 for the link.

K4GFG submitted his resignation from the PFCC, effective Dec. 31, 1986.

The next PFCC meeting will be held in conjunction with the Northern section FNCC meeting in Gainesville on Jan. 10, 1987.

Florida Two Meter Bandplan

- 145.01 Pompano Beach, Ft. Lauderdale, Miami
- 145.03 Ocala, Port Charlotte, West Palm Beach, Pensacola
- 145.05 Lake City, Daytona, Tampa, Stuart, Naples, Port St. Joe
- 145.07 Jacksonville, Clearwater, Boca Raton, Marianna
- 145.09 Crestview, Gainesville, Melbourne, Sarasota, Tallahassee, Homestead

Temporary: Miami 145.03, Orlando 145.03, 145.07, Jacksonville 145.03, Sebring 145.05, Hollywood 145.05

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PACKET COMPUTING POSSIBILITIES

Chuck Harrington, WA4GPF

Beginning this month I am changing the name of my column, formerly PACKET ON THE ATARI ST. I hope to attract a larger readership and write about some new topics, some of which are not specific to the ST or any other particular computer system. ST users may be reassured that they will not be forgotten, for the ST coverage will still remain as a portion of this column.

I wonder how many people, before they became active in packet radio, had expectations of downloading new public domain software from distant BBS systems? I did, but before the shipping carton from my first TNC had been picked up by the garbage man, reality took hold; packet now and then dealt primarily with transfers of small text files.

Almost all operation in packet uses the TNC's converse mode, which permits only the use of Ascii characters. Although Basic and other "source" codes may be sent as text, some of the best software must be transferred as a binary file.

Binary transfer in the current TNC is supposed to take place in something called transparent mode. But, all of the BBS systems operate in converse, so how can you possibly upload a program to them? In order for a BBS to accept a binary file their software would need to control the TNC somehow, and get it into and out of transparent mode as needed.

This may be possible, but we have a large WORLI BBS system in place whose software does not support such a feature. Of some additional concern, is the effect that binary code might have on the TNC that are monitoring the channel at the time of the file transfer. Binary uses all 8 bits, and will contain all bit combinations from 0 to 255, including nice things like <Esc> which is clear screen to some terminals. Suddenly these program transfers seem best suited for real time, on an appropriate frequency other than that used for normal packet operations. But if you can reach the guy direct, he is probably close enough that it would be easier to meet him for coffee and hand him a disk, rather than transfer him the file over packet! But how do we get a file to someone in a different lan?

Much can be done to bring real program transfers to packet radio. There is no reason that our BBS systems on packet, can not contain downloadable program files. A new protocol is badly needed if this is ever going to happen! We need to face the facts that sending a file over packet, is not the same as sending one over the telephone, and adjust our software accordingly. Lets compile a wish list of the features which are desirable for binary file transfer over packet.

1. The ability to transfer and forward binary files through the existing WORLI BBS system.
2. The ability to break binary files into pieces of convenient size for packet transfer.
3. The capability to use the portion of the file received correctly while filling in any missing segments later.
4. The ability to send binary files in converse mode and not have to worry about control codes causing problems to other stations.

It sounds almost too good to be true that the above four requirements could be easily met, but they have. In past weeks, Florida packet operators have been seeing some strange packets coming across their screens as I worked with a new protocol for binary file transfer. On November 1, 1986, I forwarded the first "Blocked Hex Protocol" file from Orlando to Jacksonville via K4OZS BBS in Ocala. The file was downloaded at Jacksonville and successfully run by Bob Grant, WD4BIW on his 1040 ST computer system.

The new protocol is not just for the Atari ST, it may be used on any computer system; I have tried to anticipate the needs of programmers implementing it on different systems. It is my hope that through this or some other protocol, we can finally begin to exchange computer software over packet radio. I trust that the packet community will use these new file transfer capabilities in a responsible manner, sending only "Public Domain" software over Amateur Radio and not Copyrighted software! I am sorry to say that at this moment, I am unable to release the exact specifications for my experimental protocol until the final version has been nailed down. I will try to make the details available to those interested as soon as possible in the next version of PRM.

Several developments with the Atari ST may be of interest to packet operators. The first, is that Atari has finally released the long awaited CP/M emulator. Of great surprise to me was the fact that the emulator has been put in the public domain and is presently available free of charge over many of the phone BBS systems! It is said to be a much better emulator than that written for the C-64 and other systems and with the power of the ST, CP/M may well run as fast as the on the 8 bit machines. I have not tried this emulator yet, but can't help wondering if there is any possibility of getting the WORLI code to run on this until WORLI type software can be developed for the Atari ST's own operating system. I have heard that there is a problem with the RLI code running on anything but a Xerox 820?

Rumor control has it that the 520 ST will change in January and that a new 520 will be in production. According to the phone BBS hotline, the new machine will look like the 1040 ST, but will contain only 512K ram and a single sided disk drive.

To expand on a teaser I gave last month, a new version on PACK-ET-TERM, my split screen packet terminal program for the Atari ST, is under development at present. Among its new features will be implementation of the new file transfer protocol mentioned earlier and like all PACK-ET-TERM programs, it will be free to anyone who wants it. Well, that is it for this month. I have a lot more to write about in coming months and look forward to continuing these articles in their new format.

*** Disconnected from WA4GPF!

- PRM -

INTERFACING A C-64 TO A XEROX 820

Joe Brunham, WD4KAV

I have been running the WORLI mailbox code on a Xerox 820 for several months now, and was seeking a way to transfer several program and data files from the 64 to the Xerox.

WORLI has provided software to permit the use of a terminal via the printer port, but some way was needed to slow down the normal 9600 baud out of this port so that the two machines could understand each other. I contacted Ted Huf, K4NTA, who said it would be a relatively simple matter of modifying CBIOS.COM, and wiring up some cable.

Ted successfully modified the file to permit a painfully slow 300 baud rate (the only one just about SURE to work with most any Commodore terminal software). My first attempt at getting the two machines to communicate was a failure. Investigation showed that pins 4 and 5, then 6, 8 and 20 needed to be jumpered at the male DB 25 connector that plugs into the 820 printer port, with pins 2,3, and 7 connected to both the 820 and the 64.

I have uploaded several files from the 64 to the 820 using the above modifications, with the addition of an intelligent terminal program on the 64 operating under XON XOFF flow control. Downloading from the 820 to the 64 should work too, though I have not tried it yet.

Higher baud rates could probably be used on the printer port if the 64 were to be used as a simple keyboard (dumb terminal) with no need to worry about file transfer from one system to the other.

One final note. All the above DOES NOT mean you can run an RLI BBS on an 820 with a 64 plugged into the printer port. A "real" keyboard still must be plugged into the keyboard connector on the 820 and used to bring up Hank's software at power up (pressing "A" to call up the OS). [Comments in CBIOS.MAC lead the way to modifying the sourceed]

- PRM -

Press Release

Amateur Packet Alaska announces the availability to the amateur packet community of the APA VHF/HF switch. The APA switch is designed to allow the TAPR TNC-2 or TNC-1 (or any clone such as the AEA PKT-1 and PK-80, GLB TNC-2A, MFJ-1270, Pac-Comm TNC-200, Heath HD-4040 etc.) to be instantly switched from VHF/1200 baud to HF/300 baud operation without retuning or recalibration. The switch is based on the 4066 quad CMOS integrated circuit and can be switched manually or by logic supplied externally. A simple toggle switch is included. The switch is supplied in kit form and is furnished with prime 1% precision temperature stable parts.

The APA switch, which has been operational in the Amateur Packet Alaska Network for several months, is easy to build and install and comes with step-by-step instructions. Assembly and installation usually takes less than an hour. The switch is totally enclosed within the TNC cabinet and requires no drilling of the printed circuit board. In operation the switch changes all of the components critical to the mode change and provides a new set of potentiometers for 300 baud operation. The TNC's original calibration components are used for 1200 baud operation.

The price of the APA VHF/HF switch including airmail postage is \$30 by check or money order. As an all volunteer organization, APA is not equipped to receive telephone or credit card orders. APA also has available a 15 page monograph on VHF/HF switch designs for a SASE and \$3 to cover copying costs.

Amateur Packet Alaska is a nonprofit educational, research and public service organization dedicated to linking Alaska and the World by amateur packet radio.

Amateur Packet Alaska, AX.25 Communications Trail, Ester, Alaska 99725.

- PRM -

FOR SALE

HDLC controller chips for TAPR TNC-1, HD-4040, AEA PKT-1, etc. Used WD1933, date coded 1983 (good mask), 120 ns parts, tested and guaranteed. Price including shipping, \$10.00.

Doug Drye, 3336 Hunters Lodge Rd, Marietta, GA 30062

PRM -



GRAPES

President: Paul Quillen, N4LCD
Vice-President: Justin Myrick, N4LEL
Secretary: Dave Chapman, KD4LM
Treasurer: Garey Barrell, K4OAH

Georgia Radio Amateur Packet Enthusiasts Society

Meeting: 4th Saturday, Western Sizzlin, Buford Hwy., approx 1 mile north of 285, just south of Ham Radio Outlet, 10 a.m. to Noon.

Dues: \$20.00 per year (includes subscription to Packet Radio Magazine).

.03 Lan Status Report

We've located the primary problem with the KF4JJ-1 digi. The cavity had filled with water, causing incredible insertion loss. We have removed the cavity for refurbishing. The digi is being desensed by Channel 11 (Ch 11's main antenna is only 30 feet above the digi).

When the cavity is returned to service, the sensitivity of the digi will return. The GLB TNC at the digi had also failed. Currently we are using an IC25H and a Kantronics TNC on temporary loan. As soon as the GLB is repaired, we will reinstall the KDK144 and the GLB.

The LAN digi, KF4JJ-1, is located 970 feet up the WXIA-TV transmitter tower (2050 feet MSL). The tower is on Arizona Ave. off DeKalb Ave. in East Atlanta. The current antenna is a G6 mounted on the Southeast face of the tower. To improve our coverage, we have designed a 3 element phased array that will give us a more nearly omni directional pattern and is designed to have positive null fill for close in coverage.

Currently WB4BSG is finishing the dual-port board we will be installing at the digi. When complete, we will be installing a 440 Mhz radio at the digi to link us through KD4NC into the 13/73 West Atlanta LAN, the Georgia backbone, and the Alabama backbone.

On the BBS front, we are still looking for someone to take over from KA4OVX who, since returning full time to school, is finding it difficult to keep up with sysop chores. Meanwhile, WB4BSG has a BBS running on a PC using a CPM emulator that allows unmodified WORLI BBS software to be used. This is intended to be a backup for the regular LAN BBS.

The satellite gateway project is moving forward. Byron, W4BIW, has automatic antenna control software running on a dedicated C64 using the interface developed by the Ga. Tech club. Barney, W8KJM, is installing the Xerox 820 BBS donated by KE4ZV in its cabinet. Byron has ordered the AMSAT-UK PSK modem board and Barney has gathered most of the parts needed to stuff the board. Byron has installed a HAZER system on his tower to ease antenna maintenance. Eric, AA4SW has loaned a TNC1 and the LAN has ordered an MFJ for the gateway. KE4ZV has figured out the automatic doppler AFC interface to an IC451 for automatic downlink tracking. Doppler compensation for the uplink is still under development.

The JARL has not yet activated Mode JD of FO-12 due to the post-launch tumbling the satellite is experiencing. A passive magnetic stabilizer on board FO-12 will eventually damp the satellite's motion. When activated, FO-12's mode JD will allow same day delivery of digital messages to any point on the globe. Our LAN members will have access to the satellite through the gateway.

	Digipeaters
145.01	WB4GQX-1, Sawnee Mtn., Cumming
145.03	KF4JJ-1, East Atlanta LAN, Ch 11 Tower, 970'
146.73 -	KD4NC-1, West Atlanta LAN, Sweat Mtn., Duplex
145.09	WB4GQX-4, North Georgia LAN Amicalola
224.9	Lockheed (Marietta)
14.103	K4BYK, Cumming
3.696	WB4GQX, Cumming (Southnet Experimental)
145.09	AA4EO-1, Fairmont
145.09	W4GZX, Cleveland, TN
145.01	NC4G-1, Rome
145.09/.01	WD4OQC, Cleveland, TN Gateway
145.09/.01	WB4GQX-3, Sawnee Mtn, Cumming, Gateway
145.01	W4DSK-1, Lookout Mountain
145.01	WA4TXT-1, Hampton
145.01	WB4BXO-1, LaGrange

Grape Notes

At the October GRAPES meeting it was suggested by AA4SW, Eric, that we try to keep the LAN's and LAN organizations together by a simple publication. Two "prime movers" in each primary LAN will receive this monthly newsletter sponsored by the GRAPES. The purpose of the newsletter is to let all LAN areas know what is going on in each respective LAN.

LAN's are encouraged to submit a monthly report of LAN activities. It will be published in *unedited* format in this vehicle and mailed to two members of each LAN. The content can be anything from criticism to support, facts and LAN happenings. This information could be republished in any other publication. Portions might therefore appear on bulletin boards, Packet Radio Magazine, or other local or national publications.

The purpose is not meant to be a full blown newsletter, but rather a forum of Georgia LAN events and progress. It was agreed that for Networking to become a reality, we will need this type of rudimentary cooperation from all the groups within the state.

At times there have been disagreements among LAN's and it seems that it was borne more by misunderstanding of the objectives of Packet Networking and the uneven progress made in the different areas. Any kind of forum or communication that will help in reaching that goal with the least amount of agitation, hurt feelings and politics will be most welcome.

Any copy submitted from the LAN might be re-typed by the editor but no content would be altered.

Tentative mailing date for copy submission for 1986 and 1987 is the **20th day of the month** and publication will be the first week of the following month.

Copy to be submitted to:
 Dee Knox / K14QZ, 2279 Clairmont Circle,
 Snellville, GA 30278 / (404) 972-3234
 or via packet:

@ KA4OVX (BBS)

News On The NNC Front

Network software development is proceeding slowly. KE4ZV has four-port digipeater code ready for testing for the NNC. Porting of TNC code and IP switch code is proceeding. A good assembler and linker as well as a C Compiler have been obtained for the NNC. A version of TCP/IP is running at KE4ZV on the IBM PC. This software requires a new ROM in the TNC implementing what is called a KISS TNC. We are looking for a C64 developer to port this code over to that popular machine. The code is written in Aztec C and is portable except for two small assembler modules which will have to be rewritten for any machine that hosts it.

North Georgia LAN News

The August meeting of the LAN was held in Cartersville, GA and items of interest covered at the meeting were:

1. What should be done in order to increase the reliability of the North Ga. LAN digipeaters. This entire system was installed during the winter months and worked so well at that time, that no one would have dreamed of the problems which the record breaking summer weather would produce. The path from GQX-4 to EO-1 tends to fade away during the heat of the day. Other digis within the mountains are having path problems during these hot days also. Final decision was to increase the power on EO-1 and GQX-4 to the hundred Watt or so level. It was felt that at this power level, the path should become very solid.
2. There are some areas to the extreme western end of the LAN that have trouble from time to time using the LAN digipeaters. Obvious solution here, we need another machine in the western part of the LAN in order to provide coverage toward the Alabama line. Thanks to a lot of interested people, a new Digipeater will be installed in Kingston.
3. Members present felt that these RF hardware changes should be installed during the hottest part of the summer since we know all paths work fine during the cooler months.
4. It was noted that things really happen fast when there is a good supply of interested and hardworking people within the LAN. Obviously we do.
5. Discussion was held concerning another HF BBS for the LAN. Discussion has been held previously concerning another VHF BBS. It was felt that we could probably utilize another BBS provided it was placed on the opposite side of the mountains from W4KAU. This would tend to "RF isolate" the two systems so that both would be able to run at the same time without interference. This concept and the addition of another HF BBS will be studied.
6. WD4OQC, John, reported that he is now an active member of the NNC software development gang and has recruited another programmer to help him in his efforts.

Current officers of the North Georgia LAN (145.09) are:
 President, W4KAU; Secretary/Treasurer, WB4OSD; Technical Coord., WD4OQC.

PRESIDENT'S REPORT

Walter E Miller, AJ6T

The WESTNET system of automatically linked BBS on 145.01 continues to grow, but at a slower pace than in the last few months. Links now exist from California to Utah and probably into Colorado by the time this is printed. Most (but not all) of the autoforwarding is done at night, but 145.01 is still a chaotic frequency, since most of the local BBS access and forwarding occurs on this one channel. In an effort to bring more harmony to this system, the Northern California BBS sysops have called a meeting on November 22 at the Richmond Red Cross to form a SYSOP organization. Hopefully, some operating guidelines to reduce network overload will be forthcoming from this new group.

NARCC has appointed George Flammer, WB6RAL, to its Board of Directors as Packet Radio Frequency Coordinator. George is also a member of the PPRS BoD. NARCC is responsible for coordination of all repeaters and digipeaters in Northern California. NARCC is leaning toward coordination of BBS as well as digipeaters. We currently have too many closely spaced digis and BBS on 145.01, and not enough digis on other channels. I hope coordination serves to spread the stations out and make 145.03 to 145.09 more useful, and 145.01 less contentious.

According to Greg Campbell, WB6ASR, trustee of W6AMT, the AMT organization is considering the creation of a parallel chain of linked digipeaters on 220 MHz to complement the current AMT network on 145.01 (W6AMT-0,1,2,3,4,7). Recognizing that reliable 9600 baud hardware suitable for mountaintop use is not available yet, Greg envisions that the 220 links would be at 1200 baud. Current hopes are to extend this 220 chain at least as far south at W6IXU. Greg mentioned that he and George had recently repaired W6AMT-1 (King City) which had been intermittent due to a power supply cable problem. W6AMT-0 was also down in late October, apparently due to a dead AEA TNC1. Plans are to replace it with a new TNC2 clone. The SF Bay Area gets very quiet on 145.01 when W6AMT-0 is off the air. About 850 different callsigns have been digipeated through AMT-0 during the last nine months (as logged by Greg's WA7MBL software).

Until new parallel networks, 9600 baud digis, level 3 software, smarter BBS, or some other breakthrough arrives to save us from ourselves, the most useful way to make packet operations more efficient and pleasurable is to IMPROVE OPERATING PROCEDURES. If you are going to choke up a channel with useless packets (like infinite retries into a distant BBS, or beacons every minute to announce that you are not home, or long loopback auto connects, etc., ad nauseam), at least do it on a channel other than 145.01 MHz. If you are going to have a keyboard-to-keyboard QSO direct or through one or two digipeaters, don't do it on 145.01 if another path is available. Please get a copy of WA6NHC's PATHFINDER list and experiment with the digis on 145.03, 05 and 07. If you are new to packet, learn the difference

between COMMAND and CONVERSE modes on your TNC, so that you don't transmit when you think you are sending a command to your TNC. Be careful about the setting of your UNPROTO path, so that if you do make an inadvertent transmission such as "C W6XYZ VIA W6AMT, W6AMT-1, W6AMT-2" you don't broadcast it to the entire state. Be a considerate operator; pick a non-prime-time to download that 15 Kbyte file from a BBS. If you do accidentally unleash a BBS, just DISCONNECT from it-don't leave it to eventually time out.

There were no nominations from the floor at the last two PPRS general meetings for 1987 PPRS officers. Therefore, the current Board of Directors will present a slate for next year which will include AJ6T, WA6FSP, WB6RAL and WB6ASR. Jim Titsler, AI8A, the current PPRS VP has announced that he will not be able to continue on the Board due to the pressure of other commitments. Many thanks to Jim for a job well done this past year with our newsletter and running PPRS meetings.

The guest speaker at the November PPRS meeting was Jim Ericson, KG6EK. Jim is the editor of the Western Update newsletter for LOWFERS. He described LOWFER operation on 160-190 KHz and played audio tapes of CW beacons recorded at his station. LOWFERS operate unlicensed under part 15.112 of the FCC regs and are limited to 1 watt input power and 50 foot antennas. Operators select their own callsigns (ham calls may not be used). There are 26 active LOWFER beacons in the western U.S., most of whom transmit 24 hours a day. The key to successful operation on these frequencies is a good vertical transmit antenna and very narrow band audio filters on receive. Noise from SCR light dimmers is a limiting factor in many urban locations.

The December 2nd PPRS meeting will be our annual "hardware night." We try to have a wide range of TNCs in operation at the meeting. This will be a good opportunity to see what kinds of TNCs, computers and software are in use on packet radio today. N6IA (AEA programmer) will demonstrate the PK232 and PK64 with an Apple III; AI8A will operate an MFJ-1270 with N2WX level 3 firmware and Atari 1040ST; AJ6T will bring a TAPR TNC1 with WA8DED firmware and PCjr. We still need someone to dust off a VADCG TNC (even if it's not operational it will be interesting to look at). Other volunteers are needed for some more of the TNC1 and TNC2 clones. Please contact AJ6T @ N6IIU-1 if you are willing to bring your gear to the club meeting.

Please remember that PPRS memberships run for the calendar year, so it is time to renew now for 1987. Annual dues are \$18 and membership includes a subscription to Packet Radio Magazine. To continue to receive PRM without interruption, dues must be submitted by the first PPRS meeting in 1987 on January 6th. The PPRS mailing address is PO Box 51562, Palo Alto, CA, 94303. Meetings are held the first Tuesday each month at the Ampex cafeteria (411 Broadway, Redwood City). Mark the following 1987 dates on your calendar: Jan 6, Feb 3, Mar 3, Apr 7, May 5, June 2, July 7, Aug 4, Sep 1, Oct 6, Nov 3, Dec 1.

- PRM -

MINUTES OF MAPRC MEETING

Gaithersburg, MD, September 6, 1986

Reported by Eric Rosenberg, WA6YBT

Tom Clark, W3IWI, President of MAPRC, called the meeting to order at 12:00 noon, and announced that MAPRC had become incorporated as a non-profit corporation in New Jersey in March, 1986. At meeting time, there were 42 members.

I. Reports from the regions.

- K3RLI (Wilkes Barre, PA): Links exist to Canada through Rochester, N.Y., and across Pennsylvania.

- AK3P (Harrisburg, PA): Links to State College are solid, with a BBS in State College. There are good links east (which then go north and south).

- W3IWI (Washington/Baltimore): A DC LAN has been established on 145.03 with N4QQ as a BBS, and a MD LAN on 145.05 with N4QQ, W3IWI and KS3Q all as PBBS'. Over the past two years, there has been a doubling of users every five months! The W3IWI BBS marked its second birthday on the day of the meeting, and in that time has handled 22,022 messages (an average of 31/day). In August, 1986, 2111 messages were handled. In comparison, 50 messages were handled in the month of September, 1984.

- K4GNC (Virginia): The Richmond, VA links to W3IWI PBBS and EastNet on 145.01 are very reliable. A Northern Virginia LAN has been established on 145.07.

- N8FJB (West Virginia): There are few users, but lots of forwarding!

- N3CVL (Pittsburgh, PA): Reliable links from State College through Pittsburgh and on to Cleveland and points west (to Chicago) and south (to Cincinnati).

- WD8PUH (State College, PA): Just getting PBBS started, but have good links east and west.

- WB2MNF (Southern NJ): 220 is being used to move traffic through the area onto EastNet. The WB2MNF and KC2TN BBS' have formed a 145.03 LAN, with WB2RVX acting as traffic handler only, not accessible to users. The Philadelphia/Jersey Shore group has formed a LAN on 145.09. The RATS Level 3 network is based around their 145.07 dual-port digipeater.

- WB4APR (Annapolis, MD): The WB4APR C-64 BBS is the hub for the Annapolis LAN. There are no wide area digipeaters, as the cellular approach has been taken.

II. TECHNICAL SESSIONS:

A. LAN Problems and Solutions.

Brian Lloyd, WB6RQN, talked about the use of high baud rates on 220 mHz, along with a lengthy discus-

sion of duplex digital repeater. Brian detailed his work on establishing a 9600 baud link in Germantown, MD, using Hamtronics IF strips and K9NG modems. Brian has figured that 9600 baud duplex digital repeaters will increase thruput 20 - 100 times that of a 1200 baud audio repeater. In addition, he calculates an increase in thruput of a 1200 baud duplex repeater (such as the 146.135/735 repeater in Los Angeles) as 4-5 times that of a 1200 baud digipeater.

B. HF Packeting.

Dave Borden, K8MMO, gave a brief history of HF packeting, beginning with his tests on 10 and 80 meters with W4RI. The problems encountered then with packeting on HF continue today: crowded frequencies, small shift. There was a discussion of an ALE (Automatic Link Establishment) system which would shift the frequency of the radio when the connection was made (to move the stations off a calling frequency), and too, if the path was lost. There was additional discussion of "standardizing" hardware to TNCs and radio controls, along with the need to write specific gateway and ALE software.

C. Connectionless Protocol.

Bob Bruninga, WB4APR, gave an update on his connectionless protocol developed for the National Disaster Medical System drill. Although there were problems in implementing the system for the NDMS, specifically the operators lack of understanding of their specific machine.

D. C-64 BBS.

WB4APR also talked about his "fully connected WORLI style packet bulletin board" for the Commodore 64. The C-64 BBS handles bulletins and messages, but due to the limited RAM of the C-64, does not handle files. Bob pointed out two pluses to the system: the agility of the BBS to change the radio's frequency in order to move of the LAN to forward messages in or out, and the ability of the BBS to download a file or bulletin list from a nearby RLI/MBL BBS that lets its own LAN know what's on the bigger BBS.

E. AX.25 Level 3.

Terry Fox, WB4JFI, filled in for Brian Riley, KA2BQE, and talked about networking. Terry outlined the requirements for a successful network: good RF packages, support of multiple connections, supporting the end-user. Also discussed were PADS, which translate Level 1 and Level 2 packets to Level 3, and limited packet switches which support 4 or 5 connections and have a routing table based in RAM.

AMRAD has established a packet switch, WB4JFI-9, which can be accessed on 145.01 through WB4JFI-5.

F. TCP-IP.

Phil Karn, KA9Q, give a lengthy demonstration and talk on his TCP-IP system. The system allows multiple tasks to be performed during a single connect.

Continued >>>

HAPN

Box 4466, Station D,
Hamilton, Ontario,
Canada, L8V 4S7

HAMILTON AND AREA PACKET NETWORK

HAPN bulletin #5 10-Oct-86

John, VE3DVV Hamilton and Area Packet Network

We have been very busy lately with assembling our HAPN-1 cards, answering enquiries and testing the 4800 baud prototype cards. We apologize for any inconvenience the delay might cause you. The delay is about 4 weeks at present, but we will catch up soon when one of our best work horses Max, VE3DNM gets back from his well deserved holiday in Italy.

Half the prototype modems (10) have been assembled and tested. Some had a tendency to oscillate in the transmit section, but a simple RC network added on the prototype area of the board seem to fix the problem. We are presently converting our club repeaters to 4800 baud using the boards.

Some simple technical information about the modem to clear up some misconceptions follows :

1. The 4800 baud modem is not a copy of some commercial type modem, but designed by a couple of our club members over a period of several years.
2. The modem works well with the rigs we tested. Interfacing turns out to be easy in most cases for anyone having some building experience.
3. The modem uses direct frequency modulation (no subcarrier). When no data is transmitted the radio puts out a carrier in the center of the channel. The frequency switches alternating below and above the carrier frequency when data is transmitted. The baseband frequency is 2400 Hz which is 1/2 of 4800. The modulation index is about 3 Kz. The frequency spectrum fits into a normal voice channel on 2 meter.
4. The modem has it's own squelch circuit which responds in 10-15 Msec. This allows the radio's to turn around much faster.
5. The data is not randomized and no modem synchronization burst is required.
6. The modem interfaces to both FM or PM radio's. Two jumpers are installed for when a phase modulated radio is used.
7. The modem has been successfully interfaced with the following radios :

HW202	HEATHKIT	PM
HAMTRONICS	T51 EXITER	PM
IC22S	ICOM	FM
IC27A	ICOM	FM
KENWOOD	7930	FM
UTRACOM	25	PM
SANTEC	ST144/up	FM (handheld)

8. There are three trimpots to set up (not counting the optional hardware CTS delay). These are Transmit level, Receive level and Squelch. Neither of these adjustments are critical for correct operation, but care should be taken not to overdeviate.
9. The prototype boards are designed for the VADCG TNC with a RS232 modem interface. We recently got a hold of a TAPR TNC-2 and will soon be wiring the modem up to it, bypassing the RS232 interface chips.
10. We have added the 4800 baud modem to a couple of HAPN-1 boards using the prototype area of the board. The result is a TNC that switches under software control between 4800 and 1200 baud on the same radio.

We intend to make assembly instructions available to our HAPN-1 board users for adding the 4800 baud modem. By the time the next HAPN newsletter (for HAPN-1 users) comes out we hope to have the instructions pilot tested. Our newsletter will also announce regular software enhancements as a result of user feedback.

- PRM -

MAPRC - continued from previous page.

WB6RQN is distributing the most updated versions of both the compiled versions and source code. It is also available on CompuServe's Hamnet SIG.

G. Other Topics

Tom Clark, W3IWI, talked about the National Communications System disaster test. This test utilized existing Amateur, CAP, and MARS communications systems. The lack of packet BBS' and/or experience operators at some of the destinations caused difficulties.

Tom also talked about the need for developing the connectionless protocol (as mentioned earlier by WB4APR), to allow others to copy "broadcast" bulletins...so (as Tom put it) "hundreds of users won't need to download Gateways and ARRL Letters". Connectionless protocols are being successfully used in Alaska for meteor scatter data communications at 9600 baud.

Mike Ceponis, K3MC, briefly mentioned the "Kiss TNC" project, a TNC's ROM which would allow the protocol to be written in a host computer instead of a TNC.

H. Miscellaneous.

As always, there were many disks passed out and ROM being swapped (KA9Q's TCP-IP and N3CVL with WA8DED v1.1 firmware). For the first time, however, there were no Xerox 820s, only PCs and clones (from off-shore "no names" to Toshiba 1100+s).

- PRM -

MARDA

The Official Newsletter of the



MONITOR

Mississippi Amateur Radio Digital Assn.

MISSISSIPPI ACTIVITIES

William A. Ford - WB5SXX

VICKSBURG:

Antenna improvements for VKS and a permanent home for JAN are the big news in West Central Mississippi. When VKS went on the air in April, the Vicksburg Amateur Radio Club planned to make antenna improvements during the fall. VKS is co-located with the VARC 87/27 voice repeater. The antenna VKS uses was first put into place in 1974 at the transmit site for the original Vicksburg voice repeater. When the antenna system was upgraded and a duplexer installed in 1977, the original skyhook was left in place on the tower as a backup. This site became the logical location for the digipeater.

The antenna is a Ringo Ranger at 170 feet and is fed with a double shielded flexible cable. It will be replaced with a Hi-Gain Colinear, and the feedline upgraded to 1/2 inch hardline. The existing feedline will be retained and connected to a quarter wave whip at 170 feet for possible use as the antenna for the LAN port of a dual port digi sometime in the future.

JACKSON:

The Jackson Amateur Radio Club hopes to have JAN at its permanent home at Mississippi Memorial Stadium within the next few weeks. JAN is presently located at the Mississippi Emergency Management Agency operations center. The JAN antenna is a 45 mHz ground plane which works surprisingly well.

RAZORBACKS:

There has been some success recently in forwarding traffic to the KC5JH PBBS in Little Rock. From the WB5SXX PBBS, we are forwarding to the N5BSL board in Bastrop, LA and then on to KC5JH. The path is marginal by any measure, but the traffic is moving.

ACKERMAN:

As of this writing, the K05S digi at Ackerman is still down. It is very difficult to get any packet information from North of I-20. We know there is a great deal of packet activity in the northern part of the state, particularly in the Tupelo and the Memphis Metro areas, but it seems MARDA is not

reaching these people. If the readers of PRM have contact with anyone on packet in north Mississippi, please spread the word about MARDA.

LAN DISCUSSION:

Much is being said about the creation of separate LANS to move local traffic off the TRUNK, thus preserving 145.01 for long-haul operation. This plan will eventually have some merit in Mississippi. But the fact remains, as of now this state is linked only marginally on 145.01. Any mass move to establish separate LAN digipeaters will severely deplete the limited resources which now exist.

These resources can best be utilized at present by establishing 145.01 digipeaters in locations which will help link the state. Then, as traffic increases, LANs would be established. It does absolutely no good to establish a LAN with trunking on 145.01 or some other frequency, if there is no one to link to!

Although it is a little premature to begin construction of LANs in most areas, it is not too early to begin looking at what frequencies should be used. Right now, 145.01 seems to be the most common over most of the state. It seems reasonable that 145.01 may remain, for some time, as the primary LAN-to-LAN link when LANs are established. The rural nature of Mississippi makes this feasible. It may never be necessary in the State to go to 220, 440, or even higher for linking. The traffic may never justify it.

There is a fundamental technical problem with operating a WIDE AREA DIGI on 145.01 as the first port of a dual port system, and say 145.05 as the second port. These two frequencies are only 40 kHz apart. It is near impossible to prevent interaction between the RF portions of the related equipment.

There is a section of the 2-meter band between 147.42 and 147.57 which is designated for simplex work. This portion of the spectrum is virtually unused in Mississippi. If we were to place our LANs in this frequency range, we could not only reduce or eliminate interaction, but it is also possible to use the same antenna and feedline for both ports when making appropriate coupling arrangements.

Until next month, may all your CONNECTS be many and RETRIES few.

- PRM -

[illegible]

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PACKET RADIO - DURING THE 26-28 AUGUST 1986 DIRECTOR'S CONFERENCE THE FOLLOWING PROTOCOL AND PROCEDURES WERE ESTABLISHED FOR INITIAL DEVELOPMENT AND TESTING OF A NAVMA RCORMARS HF PACKET RADIO SYSTEM. THE AX.25 LEVEL 2 VERSION 1 PROTOCOL HAS BEEN CHOSED AS THE STARTING BASIS TO DEVELOP THIS SYSTEM. INITIAL COMMUNICATION PARAMETERS WILL BE UPPER SIDE BAND, 300 BAUD, 200 HZ SHIFT OPERATION. AS WITH ALL OTHER NAVMA RCORMARS COMMUNICATION MODES, PACKET TRANSMISSION INTELLIGENCE MUST BE CENTERED WITHIN THE BANDWIDTH OF THE FREQUENCY ASSIGNED. THE FREQUENCY 11402.5 KHZ HAS BEEN ASSIGNED TO THIS PROJECT FOR 24 HOUR A DAY TESTING. ASSIGNED FREQUENCY EMISSION DESIGNATOR IS 1K24F1B. PACKET VHF OPERATION IS NOT AUTHORIZED AT THIS TIME.

THE GOAL OF THIS NETWORK IS TO ESTABLISH AN ENHANCED SET OF PARAMETERS FOR PACKET TERMINAL NODE CONTROLLERS AND MESSAGE SWITCH DEVICES FOR THE EFFICIENT USE OF PACKET IN TRAFFIC HANDLING FOR NAVMA RCORMARS IN THE HF BAND. THIS GOAL INCLUDES INVESTIGATION AND DETERMINATION OF BEST OPERATING SPEEDS AND SHIFTS FOR THIS MODE OF COMMUNICATION IN OUR HF ENVIRONMENT.

THE HIGH TECHNOLOGY NETWORK COORDINATOR, MR. JIM S. GRIFFITH, NNNOPPH, 104 LADYWOOD LANE, BESSEMER, AL., 35020 (205-428-8869) IS RESPONSIBLE FOR COORDINATION AND DEVELOPMENT OF THIS SYSTEM. INVOLVEMENT IN THIS NETWORK MUST BE AUTHORIZED THROUGH NNNOPPH AND YOUR REGION DIRECTOR. AS WITH OTHER NAVMA RCORMARS SPECIALTY NETWORK ASSIGNMENTS, QUARTERLY MEMBERSHIP REQUIREMENTS MUST BE MET IN ORDER TO PARTICIPATE IN THIS NETWORK.

- PRM -

COMPUTING ACROSS AMERICA - continued from page 3.

The Next 10,000 Miles -- A Sort of Prospectus

It's happening again; I can feel it. Every day-dream involves the Road; any new purchase has to be something "bikeable." The journey is obsession, addiction, religion, and lifestyle of choice -- by August I'll be rolling. Ahh.

But there are differences a-plenty. The Winnebiko is again the substrate, but it's now layered with more exotic systems than ever. Not including dedicated controllers and "smart logic," there are four on-board computers -- along with a satellite data link, ham radio station, and navigation equipment.

The biggest problem on the first trip involved time management, something that affects nomads as much as it does executives. I spent roughly half a business year pedaling -- 1,000 hours sitting alone on the bike. I would cruise all day across American vastness, composing tales in my head and itching to get my hands on the H-P Portable riding behind me. ("Ah, such a chapter shall this be!") But by evening I would be tired and hungry and surrounded by people clamoring for stories... and the day's ideas would drift away like the smells of camp cooking, gone without so much as a memory of the insights that spawned them. Wasted.

And so the bike has become a rolling word processor. There are two liquid crystal displays on the console in front of me, and a keyboard built into the under-seat handlebars (eight buttons for text along with various other controls). A dedicated 68HC11 microprocessor performs key code conversion while attending to bicycle management tasks, decoding finger combinations based upon an arcane letter-frequency-based coding scheme.

Whenever a valid character comes along, the 68HC11 passes it off to a handful of CMOS logic that is interfaced to the guts of a Model 100 -- making everything described so far look exactly like the original Radio Shack keyboard. The net effect is a full screen editor that I can control while pedaling.

But it doesn't stop there. An RS-232 line allows text in the tiny 32K buffer to be transferred to the 896K Hewlett-Packard system -- and from there to disk via the 3.5-inch floppy drive. Two modems cover all combinations of pay phones and modular jacks, and a fourth processor (CMOS Z80) handles AX.25 protocol control for packet data communications through the 2-meter ham transceiver... which will soon include an orbiting electronic mailbox known as Packsat. Of course, all this takes power, and the original 5 Watt solar panel has been replaced with a pair of 10 Watt Solarex units -- along with 8 amp-hours of Nickel-Cadmium battery to hold it all. Other electrical loads on the Winnebiko II include twin air horns, lights, flashers, Etak electronic compass, paging-type security system with distributed sensors, CB radio, stereo system, cassette deck for dictation and music, digital shortwave receiver, and the usual speed-distance-time-cadence instrumentation.

"Are yew with NASA?" asked the Ohio farmer, slowly chawin' tobacco while peering at the strange apparition gleaming beside the small-town pay phone.

"Sure," I answered, looking up from my online session on the burning pavement. "This here's one o' them Loony Excursion Modules."

And Now...

It will be August before everything (including the business structure, subject of my next article) is working well enough for me to abandon this tacky apartment complex to experience, once again, the pure exuberance of full-time travel. Once on the road, I'll publish weekly updates on GENie; in the meantime, I'll post an occasional message to let you know how the preparations are coming. I welcome your responses, suggestions, and invitations for the hospitality-database (another of the H-P's jobs) -- I can be reached via GEmail as WORDY.

And maybe somewhere, out there, we'll meet. I'll spend my life prowling neighborhoods electronic and physical, pausing for months at a time to explore and touch the magic. I guess that's the point of all this... I finally figured how to get paid for being a generalist. And I couldn't possibly do it without computers and networks.

Ain't technology wonderful?

- PRM -

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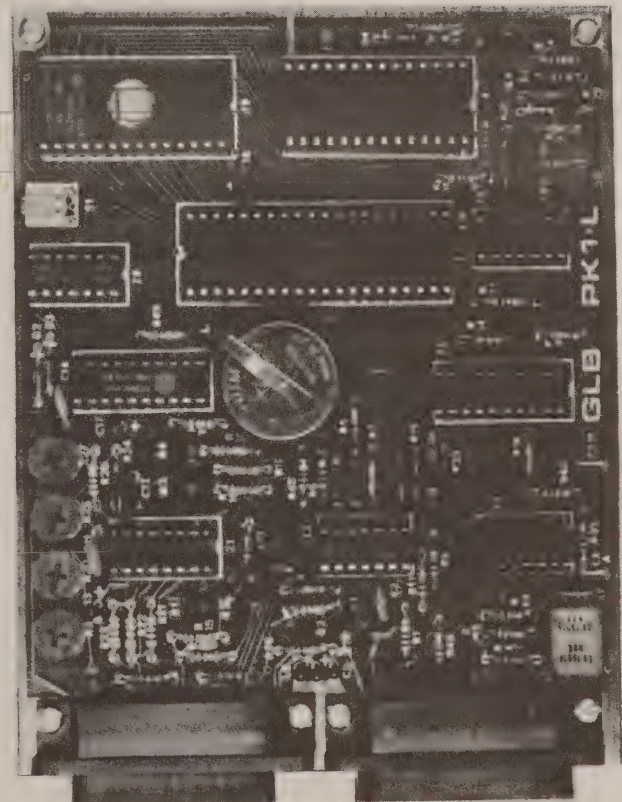
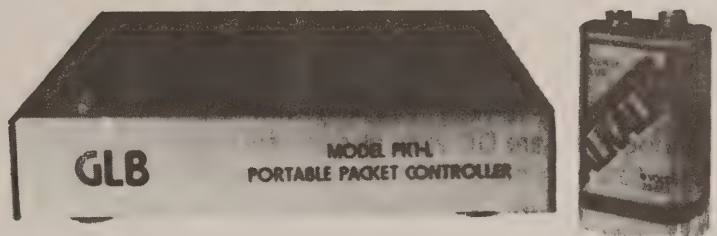
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Fourth, AEA Quality and Price

Not many manufacturers like to discuss quality and price at the same time. AEA thinks you want high quality and low price in any product you buy, so that's what you get with the Pakratts. Ask any friend who owns AEA gear about our quality. The people who buy our products are our best salespeople. As for price, the PK-64 costs \$219.95, or \$319.95 with the HF option. The PK-64A, an enhanced software unit with a longer flexible computer cable, costs \$269.95 or \$369.95 with the HF option. The PK-232 costs \$319.95 with the HF modem included. All prices are Amateur Net and available from your favorite amateur radio dealer. For more information contact your local dealer or AEA.

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PAKRATT™ Model PK-64



PAKRATT™ Model PK-232

Third, Performance and Features

The real measure of any data controller is what kind of on-air performance it gives. While the PK-64 and PK-232 use different types of modems, both give excellent performance on VHF. The optional HF modem of the PK-64 uses independent four-pole Chebyshev filters for both Mark and Space tones, and A.M. detection. The HF option can be factory or field installed.

The PK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The internal modem automatically selects the filter parameters, CW $F_c = 800$ Hz, BW = 200 Hz; HF $F_c = 2210$ Hz, BW = 450 Hz; VHF $F_c = 1700$ Hz, BW = 2600 Hz.

The PK-64 uses on screen indicators to show status, mode, and DCD (Data Carrier Detect) while the PK-232 uses front panel indicators. Both units use discriminator style tuning for HF operation. And that's just the tip of the iceberg. Features like multiple connects on packet, hardware HDLC, CW speed tracking, and other standard AEA software features are included in both the PK-64 and PK-232.

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PACKET RADIO MAGAZINE

Dedicated to the Advancement of Packet Radio

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- Two radio ports
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The TNC-220 has the familiar TAPR command set and AX.25 Level 2 Version 2 protocol running on a Z-80 processor with 32k bytes of EPROM and 16k bytes of battery-backed RAM. A Zilog 8530 SCC performs all packet HDLC in hardware. The terminal port can select either RS-232 or TTL for your C-64/128, VIC-20 or other TTL computer. Five large, color-coded LED's clearly indicate status at a glance. The power switch is now located on the front panel. The TNC-220 is enclosed in a rugged extruded aluminum cabinet with an attractive two-tone blue front panel. All indicators and controls have large, clear labels.

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PACKET RADIO MAGAZINE

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Subscriptions to PACKET RADIO MAGAZINE are available through any of the participating organizations listed below. See individual club pages in this issue for information on how to contact these organizations. If there is no participating group in your area, you are encouraged to join FADCA or TAPR. See the PSR portion of the magazine for TAPR membership information. FADCA membership dues (US Dollars): United States = \$15.00, Canada = \$18.00, Foreign (airmail) = \$25.00. Three dollars of each member's dues is allocated for FADCA operations, and the remainder is for the subscription to PRM. Major clubs wishing to participate in PRM should contact the FADCA office.

Articles and photographs are solicited dealing with any aspect of digital communications. Both technical and operational topics are desired including new product announcements and equipment reviews.

CAPRA News

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5456	BN	1966	CAPRA	WB9MJN		861118

TCP/IP Test Operation

Hi, Sunday night WB9WBN, myself and WD9DBJ brought up Phil Karn's TCP/IP code on the air. We operated the code on top of an AX.25 connect. We were unable to operate the code via unproto mode. Mike Chepponis, K3MC, has a KISS EPROM for TNC-2s that will allow unproto operation without the call-sign denotations. So we had to settle for connecting to each other, then bringing up the TCP/IP code. Jerry, had two stations on, WB9WBN-1 and WB9WBN. Both of these stations were connected into the TCP/IP computer, and the code was alerted to the dual ports. I connected to WB9WBN-1 via WB9WBN via AX.25, and Dick connected to WB9WBN v N9ATM-2. Then we both brought up TCP/IP connects to Jerry's stations. With this accomplished, the TCP/IP node at WB9WBN now knew that both of our IP addresses were live on the net. Then Dick and I, although not connected via AX.25 connected with TCP/IP. What happened when we did this is what we have all been waiting for. Dick's packets were sent to station WB9WBN, then into his TCP/IP computer, which then brought up station WB9WBN-1 and told my station of the connect thru the total WB9WBN site to WD9DBJ. When Dick would send some data, the data would go out via N9ATM-2 to WB9WBN, the data packet would get acked in AX.25, and then the TCP/IP ack from WB9WBN would be sent back to Dick's station and acked in AX.25 by Dick's station. At the same time the TCP/IP ack left WB9WBN, WB9WBN-1 sourced a TCP/IP data packet to me, and my station acked in AX.25. Then my station would send a TCP/IP ack, and finally to end everything, WB9WBN-1 returned a AX.25 ack to me for the AX.25 data packet that contained the TCP/IP ack. Although this was somewhat slow, elimination of the AX.25 acks would have speeded it up a whole bunch. This is the aim of the new KISS EPROM for the TNC-2.

73, Don

- PRM -

PARTICIPATING ORGANIZATIONS

ALA-NET	- Alabama Packet Radio Association
CAPRA	- Chicago Area Packet Radio Association
FADCA	- Florida Amateur Digital Communications Association
GRAPES	- Georgia Radio Amateur Packet Enthusiasts Society
KCAPRG	- Kansas City Area Packet Radio Group
LAPRS	- Louisiana Amateur Packet Radio Society
MAPRC	- Mid-Atlantic Packet Radio Council
MARDA	- Mississippi Amateur Radio Digital Assn.
PPRS	- Pacific Packet Radio Society
PTG	- Packet Technical Group (Detroit area)
RMPRA	- Rocky Mountain Packet Radio Association
TAPR	- Tucson Amateur Packet Radio Corporation
UPRA	- Utah Packet Radio Association
WMPRA	- Western Michigan Packet Radio Association

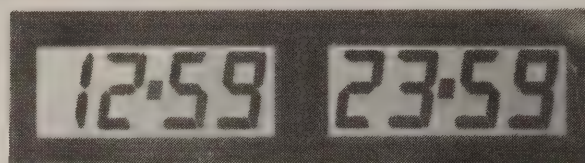
BEST OF MFJ

MFJ 24 HOUR LCD CLOCKS

These MFJ 24 hour clocks make your DXing, contesting, logging and SKEDing easier, more precise.

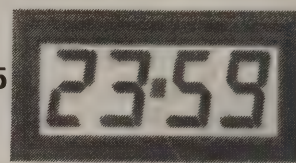
Read both UTC and local time at a glance with the MFJ-108, \$19.95, dual clock that displays 24 and 12 hour time simultaneously. Or choose the MFJ-107, \$9.95 single clock for 24 hour UTC time.

Both are mounted in a brushed aluminum frame, feature huge easy-to-see 5/8 inch LCD numerals and a sloped face that makes reading across-the-shack easy and pleasant.



LOCAL MFJ UTC
MFJ-12/24 HOUR DUAL LCD CLOCK
MODEL MFJ-108

MFJ-108
\$19.95



MFJ-107
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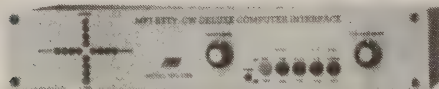
MFJ-24 HOUR LCD CLOCK

You can read hour, minute, second, month and day and operate them in an alternating time-date display mode. You can also synchronize them to WWW for split-second timing. Both are quartz controlled for excellent accuracy.

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Automatic threshold correction and sharp, multi-pole active filters give good copy under severe QRM, weak signal and selective fading.

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A handy Normal/Reverse switch eliminates retuning while checking for inverted RTTY.

An extra sharp 800 Hz CW filter really separates the signals for excellent copy.

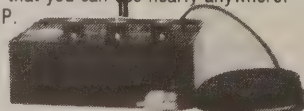
12 1/2 x 12 1/2 x 6 inches. Uses floating 18 VDC or 110 VAC with MFJ-1312, \$9.95.

MFJ PORTABLE ANTENNA

MFJ's Portable Antenna lets you operate 40, 30, 20, 18, 15, 12, 10 meters from apartments, motels, camp sites, vacation spots, any electrically clear location where space for full size antenna is a problem.

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COMPUTING ACROSS AMERICA

Music, Mosfets, and Sunsets

Steven K. Roberts
Bainbridge Island, WA

I suppose this machine really does look strange to people. I've been living with it for so long that I usually only see a list of uncompleted projects ranging from waterproofing to CMOS logic design. But when I ride down the street, people gape, and the local media are having a field day. Front page color in the Seattle Times; PM Magazine this week. Ah, this life of high-tech nomadics...

Of course, I deliberately frolic in that strange region where the distinctions between technology and magic blur -- where anything you say will be believed because your looks alone overwhelm the senses. The other day I was at the Streamliner Diner, immersed happily in a flawless omelette and watching the crowd around the bike. A mother walked by with her 4-year-old boy.

"Hi there, sonny," I said into the handheld transceiver. Through low-power 2-meter simplex, my voice was conveyed to the Winnebiko -- where it crackled from the console speaker. The kid froze, uncertain. He stared at the machine, ready to cry if necessary. "So what do YOU want for Christmas?" it asked him.

His eyes widened as his mother scanned the area to find the hidden camera. "I want a train, and a bicycle, and..."

"A bicycle like me?"

The boy's face lit up in pure wonder. "Yes."

"Well, we'll see what we can do about that." His mother began tugging him along the sidewalk. But he resisted long enough to gaze at the machine and wave solemnly.

"Bye-bye, Mr. Bicycle."

Of course, such play is only the beginning. Since the bottom line of this venture is FUN, much of my development work centers upon system capabilities that are not entirely aligned with that steely-eyed business world that swallows up most otherwise well-intentioned computers. Today saw the 68HC11 and its custom interface logic spring to life -- not all debugged yet, of course, but getting there. The bike can now make comments in its synthesized voice, from "please do not touch me" when it detects vibration, to "oh no... here he comes again," when a radioed touch-tone command lets it know that I've finished lunch and am about to add my body to its 225-pound static load.

Hey, why not? Computers *should* be fun, shouldn't they?

Speaking of fun, life on Bainbridge Island continues to be a mingling of obsessive design work and

pure pleasure. A few days ago Maggie and I hopped on a couple of Octo Company's resident mountain bikes -- agile machines with automatic transmissions, quite unlike the lumbering megacycles we are about to call home. Off into the woods we went, into deep green antiquity, whispering through silence so deep that our clicking freewheels seemed as grating as chainsaws. All around us were the projections of past and future: long-dead trees sinking into the forest floor below new growth sprouting green and perky into patches of flickering sunlight. Yeah, thanks for the reminder... we're just passing through...

As a hint of approaching sunset pinked the sky, we emerged from the woods onto Manzanita Bay and found a spot by the clear water. A sky show was beginning, humbling us further, drawing us into a sweet melancholy touched with awe. Dancing gold on the watertop, clouds gilt-edged platinum, textures from the crystalline to the vaporous, moment-to-moment changes too subtle to notice and too powerful to ignore. This, folks, was a world-class light show, and I remember chuckling at the memory of those dancing lights that held me enraptured night after night, back in the strange 70's. In this electric sky there was beauty profound enough to tickle our lachrymal ducts and elicit soft moans of sensual appreciation.

And there was more. We ferried to the City, upstream at rush hour, smiling our way through a flood of grim commuter faces racing the clock as always. We strolled to the Opera House and were suddenly surrounded by the expert musical caress of Andreas Vollenweider and friends -- jazz harp, flutes, synthesizers and percussion. Perfect. The group explored acoustical textures as colorful and delicate as that sunset, raising goosebumps, raising the roof, raising awareness. At the last standing ovation, Andreas quietly spoke, "thank you."

"No, thank **you**!" someone cried out, and the applause swelled again like another onslaught of Olympic rain. This was not ordinary music, this extended orgasm of sound; this was exquisite proof of Beethoven's insightful observation that "everything in music must be at once surprising and expected."

Ah, rhapsody, rhapsody. As the Road gets closer, I renew my resolve to spend my life meeting remarkable people, seeking the pleasures of growth and discovery, and smiling as much as possible. What an odd land this is, where a bicycle loaded with computer systems can be a ticket to exactly that. (As a British lady at Expo observed, while looking at my bike: "Only in America!")

See you next week. We'll be on the island a while longer, and will then pedal frantically south as winter begins its warning chill. I suppose everything in my life is surprising and expected, as well...

- PRM -

President's Report

Walter E Miller, AJ6T
PPRS President

NEW NORCAL PACKET FREQS ANNOUNCED

NARCC has approved four new 2 meter packet channels in Northern California on 144.99, 144.97, 144.93 and 144.91 MHz. Existing remote base voice operations on 144.95 preclude sanctioning of that channel now. At the recent meeting of Northern California BBS sysops it was agreed that 144.91 would be reserved as a channel with no BBS activity. Sanctions for new digis and BBS on these channels should be obtained through George Flammer, WB6RAL, the NARCC frequency coordinator.

NORCAL BBS SYSOPS MEET IN RICHMOND

A big meeting of almost all of the Northern California BBS sysops and other interested parties was held at the Richmond Red Cross on Nov 22, 1986. The meeting was called to bring some order to the chaos on 145.01, and to make plans for more efficient packet networking. The following groups were represented: EBPR, GVPS, PPRS, SACPAC, SF Radio Club, and W6AMT. The discussions were wide ranging and often disjointed. NI6A announced that WESTNET now has links into Utah, Colorado, New Mexico and Texas. There was a lot of discussion about congestion on 145.01 and how to reduce it. WB6RAL complained that there has been no sysop coordination until now. "Prime time" was defined as 5 PM to 2 AM local time, and the Sysops agreed on a voice vote not to forward traffic on 145.01 during prime time (so that users would be free to access the BBS in the evenings after work, and to make other connections without BBS QRM). AA4RE will keep a registry of 2 meter forwarding time slots. WB6RAL announced plans for an AMT 1200 baud parallel network on 223.58, and AJ6T announced PPRS plans to support such a network with long term loans of TNCs to digipeater operators on that channel. There was very strong approval among the group for such a backbone network (which would be used mainly for BBS trunking). WB6RAL said the AMT group would have a 220 machine up on Crystal Peak by the end of the year, and that new level 3 code was being written for the 2 meter AMT chain. WORLI was "shocked" that local stations were not assigned to LANs here in California as they are in EASTNET. WD6BFC suggested that all stations sign their messages with the @ symbol (for example, AJ6T @ N6IIU-1) to ease the routing problem. WA6FWW promoted the concept of BBS as an archival storehouse with a very large data base; others objected strongly to the idea of a BBS as a "magazine stand." W39LOZ announced a new BBS, W6PW-3, in San Francisco on 144.99 (with autoforwarding on 145.09 from 12-6 AM). WORLI and N4CHV described the evolution of the

20 meter packet network, and offered their stations as HF gateways for crosscountry linking. There was some discussion of the HF STA in preparation by the ARRL (the STA reportedly will not be submitted to the FCC until June 1987). WORLI announced that he will not write any more updates to the original version of his autoforwarding BBS software (11.6 is the last official version); however, he is writing an entirely new compatible BBS program in "C" which can be compiled for use on virtually any computer. This new code should be available by Christmas, and it will be distributed via Compuserve and other channels. Standard message headers were discussed briefly, but no general agreement was reached on that topic. N6JLJ pointed out that packeteers have not focussed much on emergency communications and that issue needs higher priority. N6KL described an interesting system based on WA8DED host mode for automatic tracking of emergency relief workers and their families. After the meeting NI6A conducted a tour of W6CUS-1 BBS which is located at the Richmond Red Cross. The sysop group will meet again next year in Sacramento.

PPRS "HARDWARE NIGHT" BIG SUCCESS

The annual PPRS December "hardware night" meeting was well attended. N6KL brought AA4RE's PAC-COMM PC-100 dual port packet controller on a half size IBM PC plug in card (it features 2 serial channels and two AMD7910 modems). N6FQR showed us his old VADCG board (the granddaddy of all TNCs) and also brought N6IIU's portable packet station in a suitcase (TNC2, ICOM 220/440 rigs, TI Silent 700 printer terminal). KG6AF displayed an AEA PK232 and the brand new PK87 (the packet-only version of the PK232). The actual operational stations included the following: WD6CMU had an IC22A and Heath TNC1 clone plus WA8DED firmware running with a homebrew 68008 computer and hard disk; Eric demonstrated an experimental mailbox he wrote in "C" which features multiconnect capability. W6FAK brought two stations: KPC2/Wilson HT and PK80/TS711 running on a Compaq portable with Procomm 1.1 terminal program. WB6KHP brought a KPC1/Yaesu/Brother EP44 setup. AI8A demonstrated his level 3 station which consists of a TAPR TNC2 (with N2WX EPROMS), TS711, and an Atari 1040ST (running the public domain WA4GPF terminal emulator). AJ6T's setup was a TAPR TNC1 (with WA8DED firmware), IBM PCjr (running Procomm 2.42), and FT726R. There was a lot of RF flying around that night, and a good time was had by all.

OTHER PPRS NEWS

The 1987 PPRS officers are: President, Walt Miller, AJ6T; Vice President, Dave Palmer, N6KL; Secretary, Greg Campbell, WB6ASR; Treasurer, Bill Weaver, WA6FSP; Frequency Coordinator, George Flammer, WB6RAL.

Continued >>>

Packet 1200 Baud PSK

Tom Clark, W3IWI

12630 BN 570 ALL W3IWI 861119 Packet PSK first

This message is the first use of PSK on a packet BBS. At this time, I am connected to Jack, W3TMZ, on 145.800 PSK. Jack has his PBBS configured as as Gateway which is then connected to the main W3IWI PBBS on 145.05.

Jack is running a G3RUH packet modem, while the W3IWI PSK port is running the QEX/JARL/JAMSAT/TAPR prototype unit.

Our connection on 145.800 PSK seems to be rock-solid with zero retries.

I believe that the tests between W3TMZ and W3IWI are the first two-way PSK packet QSO at 1200 baud. Any challengers?

73 de Tom, W3IWI via W3TMZ via W3IWI

I also ran so quick sensitivity checks and found that I could cut my xmtr power by something like 20dB and still maintain a solid link. We were both using pretty normal TXDs and the only problem we experienced was some desense from local QRM with both links on 2M. The eye-patterns I see on Jack's PSK indicate that he has some work to do on equalization. Next test will be to make detailed comparison of demod performance of G3RUH vs. the QEX/JARL/JAMSAT TAPR prototype. Stay tuned for more news

It is now time for me to get up on the soapbox with some more comments about PSK in the 'real world': I now have somebody to test PSK with on the air -- W3TMZ has his G3RUH board running and we have been running PSK packets between us on 2M for the past 3 nites. Jack has not yet implemented the 1600 Hz tone 'PSK' modulator and is still using the stock 1200 Hz 'Manchester' configuration (see previous notes to clarify the definitions I am using). With Jack's Icom radio, the modulation spectrum with the 1200 Hz carrier is clearly not centered in the radio's passband. Looking at eye patterns on this end of the path, the 600 Hz data component (arising from alternating 1/0 sections in the 1200 baud data) is suppressed in amplitude by about 6-8 dB from the lower frequency components. On the other hand, the FO-12 spacecraft PSK, and the PSK I generate here locally with a 'carrier' freq of 1600 Hz, do not show the 600 Hz modulation component to be suppressed -- the eye-patterns are beautiful. Since any single bit error kills a packet, this would seem to indicate that our path is sub-optimum by at least 6 dB due to this condition.

Nevertheless, we tried some interesting tests last nite with Jack transmitting to me. Using the 20 dB attenuator built into the TS811 plus Jack's power output knob, we were able to twiddle things to 'hit the wall' described above. We then repeated the test using conventional AFSK-FM and found the 'wall' to be at a power level about 3 dB higher. Admittedly the measurements were crude, with an accuracy of only 1-2 dB, BUT!!!!!! That 3 dB plus the 6 dB that I know Jack will gain when he is able to use a 1600 Hz carrier would say that using PSK for convention

terrestrial applications will yield a weak signal improvement of at least 9-10 dB. Those of us packeteering in metropolitan areas know that we have a serious spectrum resource problem. Our 5 FM channels from 145.01 to 145.09 are getting so crowded that often they become unusable. By going to PSK, channels could be spaced 3-4 kHz apart making something like 25-30 channels in the same spectrum we now use for five, and the performance will be better!

So this is a challenge to other experimentally minded folks, even if you have no interest in PSK on the FO-12 satellite: Let's start the second packet revolution! For your 1200 baud links, plan to break the tie with AFSK-FM Bell 202 modem standards. There is a much better way to do things!

- PRM -

While we're on Tom's favorite subject, namely packet "firsts", I should add that the very first high level protocol to run on top of the new 1200 bps BPSK modems was TCP/IP. During Tom's hotel room PSK demo at the recent AMSAT convention, I brought up my code on a PC clone and ran it through Tom's TNC, JAS PSK modem and 70cm radios. Naturally, it worked just fine!

Ordinarily, I'm more interested in doing something "right" instead of doing it "first", but since the opportunity for a propaganda coup arose I couldn't pass it up.

Phil R. Karn, KA9Q

- PRM -

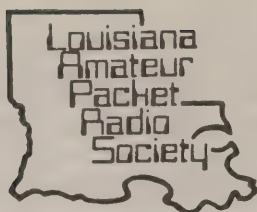
PRESIDENT'S REPORT continued from page 4.

At the December general PPRS meeting the membership voted to continue our affiliation with Packet Radio Magazine. Please get your \$18 dues for 1987 to PPRS no later than our next meeting on Tuesday, January 6, 1987 in order to receive PRM without interruption. Continued support of PPRS is essential if we are to donate/loan hardware to advancing packet networking in Northern California. The PPRS mailing address is PO Box 51562, Palo Alto, CA 94303.

During Thanksgiving vacation I was able to visit some of our northernmost PPRS members in Eureka. I had a very interesting meeting with Jack (KA6NEO), Pete (KE6LF) and Mike (KA6PGN). Their Humboldt Packet Radio Society has about 13 members. KA6NEO-1 and N6IJB-1 are the only digipeater routes out of the Eureka area. N6IJB-1 is solar powered, and it hits W6AMT-7 fine as long as the battery stays charged (but heavy use can outrun the solar recharge rate). Jack plans to upgrade KA6NEO-1 with a new antenna so that it can reach W6AMT-7 reliably (this digi shares a site with TV channel 6 and has desense problems). I hope the HPRS can keep us in touch with the packeteers in Oregon. KE6LF is interested in 6 meter meteor scatter packet experimentation-any takers?

I suspect that Santa will leave many new TNCs under Christmas trees this year, and that means we will see another influx of new packet users. Remember how tough and confusing those first few packet QSOs were for you? Keep that in mind and try to be helpful and courteous to our newest packeteers. Let's try to steer them toward good operating practices without becoming stern packet policemen.

- PRM -



The Official Newsletter of the LOUISIANA AMATEUR PACKET RADIO SOCIETY

The following info is so interesting, that I have pre-empted my usual monthly column to present it to you. Have a healthy, happy New Year! de NE5S

A Proposed Packet Station Locator and Router

Fred Hatfield, K8VDU @ WB5BZE
Box 52466 New Orleans, La. 70152
(504) 891-4862

At this stage of packet radio development, there is a fertile field for experimentation - automatic locating and routing of packets.

For years, I wrote software for calculating long distance telephone charges based on a grid of vertical and horizontal coordinates used by AT&T. These 'H & V' coordinates cover every central office in the continental United States, Hawaii, Alaska and Puerto Rico. The coordinates are available in published FCC tariffs and many commercial publishers of communication aids. (See FCC Tariff #264). A simple algorithm can be used to calculate mileage distances and will be presented in a BASIC program that can be used for testing this technique.

Each H and V coordinate is based on the physical location of the telephone central office serving that area. In other words, each digipeater location is uniquely identified by means of its area code and exchange. Note that it is not necessary to know the FULL telephone number, only the area code and exchange. If we think of the area code and exchange as a 6 digit 'key', it is simple to locate it physically by looking up the V and H coordinates. For example, my telephone number in New Orleans is 504-891 4862. Using the 6 digit key '504-891', I find my V and H coordinate is 8483 2638.

By using a sequence of look-up tables that contain digipeater or BBS identifiers with corresponding H and V coordinates, automatic routing paths can be automatically determined by software. Since the H and V coordinates will allow you to calculate distances and directions, a table arranged by vertical or horizontal coordinates in sequence with corresponding digi identifiers would allow the software to determine 'hops' to reach a predetermined destination.

In operation, the user need only to indicate the target location of the destination by digi ID (such as BTR or LCH). The program would scan the table which contains digi IDs and their V and H coordinates. When the proper terminating digi is found, a route can be automatically determined by tracking the V and H coordinates between the source and destination. Since mileage and direction can be calculated from that information, the proper 'hops' can be determined for routing.

If you keep such tables available in your TNC software, they could be automatically updated from digis or BBS by means of sending a unique packet

when connected. Of course, it is only necessary to do that if you don't already have them entered. A BBS could include the V and H coordinate as information in its beacon, thereby locating it uniquely if you should pick it up as 'DX'.

I have experimented with some of these ideas for the digis in Louisiana as supplied by the LAPRS DIGI/BBS MAP by NE5S and available on the WB5BZE BBS. For those of you who would like to experiment with this technique, I have supplied the BASIC program to calculate mileage distances and a table of V and H coordinates keyed to the LAPRS map. I can also supply V and H tables for any area code in the United States that will give unique locations for every exchange in that area code. The algorithm will work for any location in the United States.

LOUISIANA DIGI AND BBS H AND V COORDINATES

AEX = 8409 3168	LFT = 8587 2996
BTR = 8476 2874	MLU = 8148 3218
HMU = 8407 2755	MSY = 8483 2638
IER = 8368 3318	RSN = 8185 3310
JNZ = 8639 3106	SHV = 8272 3495
LCH = 8679 3202	SIL = 8395 2610

```
10 'Calculate Mileage Algorithm for Packet
12 'extracted from SCAN.TRA pgm <861128> fah
20 REM <811002> FAH
50 DIM M(6):M(1)=.9:M(2)=8.1:M(3)=72.9:M(4)=656.1
60 M(5)=5904.9:M(6)=53144.1
70 V1%=8483:H1%=2638 'default coordinates for MSY
100 INPUT "Enter V and H coordinates: ";V2%,H2%
110 GOSUB 3000
120 GOTO 100
130 STOP
3000 '====mileage calculation algorithm=====
3010 REM CALCULATE MILEAGE FROM V&H COORDINATES
3015 REM RETURN WITH MILEAGE IN MI%
3020 HM%=H1%-H2%:IF HM%<0 THEN HM%=H2%-H1%
3030 VM%=V1%-V2%:IF VM%<0 THEN VM%=V2%-V1%
3040 CNT=0
3050 CNT=CNT+1:HM%=HM%/3:VM%=VM%/3
3060 MI!=HM%^2+VM%^2
3070 IF MI!>1777 THEN GOTO 3050
3080 MI!=MI!*M(CNT):MI%=SQR(MI!)
3085 PRINT MI%;" miles"
3090 RETURN
```

The default coordinates in statement 70 are for New Orleans. The mileage calculations will be for distances from New Orleans. If you are testing this algorithm from another location, simply change the default V and H coordinates to your own location. If you do not know your own V and H coordinates, I can supply those to you if you will provide me with the area code and exchange of your telephone number (at the location of your tnc or digi, of course). Contact me by packet @ WB5BZE or call by landline. If I am not at home, leave info on answering machine and I will return info by packet. Your comments, and ideas are solicited.

Packet Status Register

December 1986 #24



Tucson Amateur Packet Radio Corporation

President's Corner

Lyle Johnson, WA7GXD

NOTICE!

Nominations are coming in for the TAPR Board. Please hurry if you have a candidate in mind. You may make it under the wire...

END OF NOTICE!

The past month has been an extremely interesting one for me. HAM/WEST, COMDEX, AIWA, PSK and HF have been at the forefront (pretty broad front, I suppose).

HAM/WEST

The Las Vegas convention was well attended, with perhaps 2,000 attendees. There were some last minute hitches, including the programs getting delayed at the printers and not appearing until the second day. John and Jan certainly have put a lot of effort into making HAM/WEST a success.

Packet got exposure on both days, with two forums per day. Dave Pedersen, N7BHC, spoke on Packet Basics while I covered the Advanced Topics discussions. All sessions were well attended.

I personally want to thank all of you who came by, asked questions, provided comments and generally communicated (both positive and negative topics) for your inputs at this convention, as well as all the various conventions that I attend. There is nothing more valuable to me as a TAPR officer than one-on-one feedback, and conventions provide an excellent means for this to occur. Don't hesitate to corner me the next time you see me!

COMDEX

Pete Eaton, Gwyn Reedy, Andy Freeborn and I decided to hang around Las Vegas for the big COMDEX show that took place the Monday after HAM/WEST.

And I thought Dayton was a zoo!

There were about 100,000 people (plus or minus a couple dB) registered for COMDEX. In case you don't know, COMDEX is a computer show put on by manufacturers and distributors who are looking for OEMs and dealers for their products. It isn't intended as a general public affair.

If what I saw is any barometer, the IBM PC-AT clones and 80386 machines are about to take over the world! There were only a handful of 8088-based PCs, one or two Amigas, an Apple II GS, maybe five (5, count 'em) MacIntoshes and -- surprise -- a few dozen Atari ST machines.

The booth with the greatest excitement had to be the Atari booth. They had a prominent space, partitioned it into small exhibits which were then filled by third-party software and hardware developers who are supporting the ST series. The booths were manned by a morning group and a (slightly different) afternoon group.

And you couldn't get near it.

I had to squeeze and push and generally be, shall we say "assertive", to get into a cubicle and see what was happening.

Reminded me of the early days of packet...

Speaking of packet (funny how that subject often crops up), Hank Magnuski, KA6M, early US packet pioneer, was there exhibiting his company's newest PC add-in card. It lets you send and receive Facsimile (FAX) images with standard FAX machines. Uses 9600 bps modems on a standard telephone line. Anyone out there experimenting with picture transmission via packet?

AIWA

Back in the mid '60s, I owned what was then a hi-tech device. It was shaped like a briefcase, but, when you opened the cover, it was a 7-inch reel-to-reel tape recorder. If it had a white case, it was a two-track machine; black cases held a four-track unit. This battery-powered portable tape recorder was made by AIWA, a Japanese audio firm.

Earlier this year, AIWA entered into the TAPR TNC 2 OEM Agreement and began development of an Amateur packet controller.

The week of November 17th, the TAPR office was visited by three gentlemen from AIWA. They bore a prototype of the new AIWA APX-25 Packet Controller (see photo). If I had to use a single word to describe their product, it would have to be a very colloquial "slick," so I won't.

The unit looks like a piece of stereo equipment, down to the sculpted grey face panel with drop-down

door. Under the door are the DIPswitches for setting baud rates on the serial and radio ports, a self-test switch for invoking audio loopback (with front-panel LED announcing that loop-back operation is in effect) and a switch for selecting the internal or an external modem.

And, when you select 300 or 1200 baud, the internal modem automatically reconfigures for Bell 103 or 202 tones.

Even the POWER switch is on the front panel!

The modem is built around the AMD 7911 "World Chip" IC (this is a variant of the 7910 chip used by Kantronics, PackeTerm and others).

There are two rather interesting additional features of the APX-25.

The first is a built-in speaker connected to the line. It allows you to monitor the packet channel aurally (a very good idea). And there is a soft chime that is activated when a station connects to you. Not a raucous alarm, but a gentle tone. Of course, the speaker/chime is enabled or disabled by one of the DIPswitches behind the little drop-front door.

The second feature is an HF tuning aid. This is a three-LED display that, with a few minutes practice, enables you to tune to within about 30 Hz of another HF packet station's signal. Not bad.

The back panel of the APX-25 is clean. There is the AC power cord (this unit isn't designed to operate from a DC source), a DB-25 RS232 serial port connector, a radio connector, and...

There is a separate set of mic and spkr jacks especially designed to interface to handie-talkies and an external modem connector (with all the right signals for interfacing to an external modem, such as the TAPR PSK modem now under development for use on FUJI - FO12).

All in all, the APX-25 is a class act.

For the time being, AIWA will only be marketing these units in Japan, but if you happen to be in Akihabara next month...



PSK MODEM

The TAPR PSK Modem project is moving along. As may be expected, the schedule has slipped a bit, but a review of the redrafted schematic was held in Tucson in early November, and board layout is taking place as this is being written. With a bit of luck (don't count on it, says the voice of experience) we should be testing some "alpha" units during the Christmas holidays. If they work, "Beta" testing will immediately follow. That targets an initial release perhaps as soon as early February.

Tom Clark, W3IWI, has been doing a terrific job of testing a prototype unit and has successfully copied packet-formatted telemetry from FUJI, as well as conducting terrestrial point-to-point testing. The weak-signal performance of this modem design appears to be very good.

This project has many of us very excited. Stay tuned!

HF

It seems that I have been writing a lot about HF packet recently. This is simply because, to me, HF is where packet is like traditional Amateur radio, as opposed to VHF operation, which is (often) more like using a telephone modem to a data base.

Don't get me wrong. I almost depend on VHF packet. The "local" PBBS is W1FJI. 'FJI is in Phoenix, about 120 miles from my home in the south end of Tucson. Unlike many of you, this local PBBS is "0" digipeat hops away.

Here in Arizona, and especially in Tucson, we do things differently. We're heretics, I guess.

Rather than put up a wide area digipeater (with the attendant problems of hidden terminals, needing to go to dual-porting, poor throughput, etc.), we put up a full-duplex repeater. It is located on a mountain peak at around 9,000 feet, and has a radius of coverage of about 140 miles.

With this system, everyone can hear everyone else pretty well, so retries are minimized. And since the repeater is in such a good location, it is useful for voice or packet emergency communications. Voice where spelling isn't important, packet where message accuracy is. We just use a 30 second timer on the machine to discourage voice use, and have the frequency coordinated as a packet channel. Simple, and it works well.

Of course, a digi is planned for co-location, so we can be ready for multiport NNCs when they become available. And of course, so we can have fun with retries, collisions, hidden terminals and...

But, as I was saying, HF is more like traditional Amateur radio. You make a QS0, you actually QS7 (funny, the radios still have tuning knobs!), you chat with someone you will probably never see, maybe work some DX, and in general have a lot of fun.

Eric, N7CL, has been doing lots of testing with various TNCs and modems. In this issue of PSR, he

Continued >>>

Beginner's Corner:

Proper VHF Radio Interfacing Techniques

Eric Gustafson, N7CL

Since about 1982 I have been helping new packet stations get on the air here in the Tucson area. This has revealed 2 major problem areas for the newcomer who is putting a packet station on VHF narrow band FM. These are:

1. Excessive deviation resulting from overdriving the radio microphone input stage.
2. TNC timing parameter settings which are incompatible with the transmit/receive changeover delay time of the radio being used. Also, settings which are incompatible with the DWAIT, RESPTIME or FRACK settings in use by the other users of the packet channel.

Since there is usually plenty of help available on the air for TNC parameter setting problems, I will restrict myself to the radio interface problem here.

Lately I have been answering a lot of questions like "Gee, I can copy Jim FB on phone but not on packet...why is that?"

I have also noticed that almost every single newcomer I hear is grossly overdriving his microphone input. I thought this was just a lack of sophistication on the part of the new packeteers until I went to Dayton this year (1986).

At Dayton I had the unique opportunity to use a communications analyzer to observe signals from most of the manufacturers in the packet radio business. In one two hour period, I copied 16 different callsigns. These included my own and those of all the manufacturers who had stations on the air at the show. Only one of those signals (mine) had the deviation set anywhere near the proper levels for packet operation. In fact all but 2 were actually sending square wave tones! All of these signals were overdriving the microphone input stage enough to cause the modulating tones to be distorted by the deviation limiter in the transmitter.

is starting a two-part (may stretch to three, we'll see) series on interfacing a radio and a TNC, then report on his "denominator" modem and describe some of the steps necessary for truly effective HF packet operation. Along the way, he will be reporting on the relative performance of several HF modem products (AEA PM-1 and PK-232, Kantronics KPC-2400 and UTU-XT, TNC 2 clone).

I think you may find the results rather surprising.

I did!

Happy packeting!

- PRM -

Since even the manufacturers apparently don't know how to interface their packet equipment to radios, I am not surprised that few of the users do!

I have written this to provide some help to newcomers to packet radio in the area of getting their new packet gear interfaced properly to their VHF narrowband FM radios.

As currently configured in the TAPR TNC and clones, modem output levels are much too high for driving microphone inputs. This is so severe that in most cases the level control in the TNC cannot be set to a nonzero level which will not overdrive the microphone amplifier stages. This was done (I believe) to allow directly driving high level 600 ohm auxiliary tone inputs or audio distribution networks. This is fine, but it doesn't represent the situation for the vast majority of packet users. Also, not enough information is presented to warn a new user that this is the case.

So, what is a reasonable deviation level to use for packet? And how does one cure this problem?

To answer the first question I must digress a bit and talk a little about one of the characteristics of NBFM. Don't panic, I'm not going to get carried away with a lot of FM theory. There are plenty of sources of information on the mode starting with the Radio Amateur's Handbook if you want to understand all the technical details.

If you have been on VHF FM for any length of time, you will have noticed that as a signal fades into the noise there are actually 2 noticeable thresholds that are crossed.

The first is the transition from absolutely no noise to a slight hiss in the background. This is the point at which the minimum amplitude excursions of the signal are no longer above the limiting threshold of the receiver. Generally, the signal is still perfectly readable (and copyable on packet) until the second threshold is reached. As the signal level falls toward the second threshold, the hiss gets a little louder but remains just a background hiss.

The second threshold is the onset of a pulse type noise or "popping" sound. This is the point at which the phase demodulator in the receiver can no longer follow the carrier frequency correctly 100% of the time. Every time the demodulator loses track of the carrier, you hear a pop in the receiver audio output. I call this "popcorn" noise. The popcorn noise threshold is the limit for copying packets. Below this threshold the AFSK demodulator (anyone's) cannot recover error-free data. However, because of the powerful signal processing algorithms used by the brain, these noise pulses are only a minor irritation to the human ear. This is usually why Jim is readable on voice but not packet.

Why all this stuff about noise thresholds?

Well, it is because the popcorn noise threshold varies when there is modulation present on the carrier. In general, the more deviation, the more signal level required to get above this threshold.

This effect is small with low values of deviation but increases dramatically above about 3 kHz deviation. In the commercially available NBFM transceivers that I have had a chance to measure, it appears to be an increase of about 5 dB when going from 3 kHz to 5 kHz deviation (assuming a properly preemphasized signal).

You can get carried away with running reduced deviation, however, and too little deviation can cause problems too. This is because the signal-to-noise ratio presented to the AFSK demodulator in the TNC is degraded as the tone level approaches the hiss noise (remember the first threshold?) level present at the receiver output. You aren't in much danger from this effect unless you are running significantly less than 2 kHz peak deviation.

The answer (finally) is to take steps to assure that you are running somewhere between 2 and 3 kHz deviation. If you are measuring deviation while modulating with a single tone, use the high (2200 Hz) tone.

The cure for the excessively high modulator output level is simply to put a resistor in series with the AFSK audio output of the TNC. I have been using this method with great success. A capacitor can be used in conjunction with the resistor to correct the audio response of those transceivers which do not properly preemphasize the modulating audio.

I like to set the TNC audio output level to about 200 millivolts peak to peak and then select a series resistor which will assure proper drive to the radio microphone stages with this (200 mV) output level. The best place for this resistor is inside the radio between the digital audio interface connector (So? Add one to the radio!) and the microphone input stage. Alternatively, it can be placed inside the microphone connector used to bring packet AFSK tones into the radio.

Using a series resistor in this manner has the advantage of not requiring the TNC output level to be readjusted for each of several radios I use for packet. I can freely interchange TNCs and radios without having to worry about making any audio level adjustments.

It would be nice if the radio manufacturers would standardize on a reasonable external tone input level so that radio modems could all be designed for an output level that would result in proper radio operation (yes, this all applies equally well to RTTY AFSK tone data too!). I would like to take this opportunity to vote for 200 millivolts peak-to-peak! But, alas, until then the poor user will have to take steps to insure that his particular device is working properly with his particular radio. Unfortunately, in the case of NBFM transceivers this usually requires access to test equipment not readily available to the average amateur.

If you are indeed an average amateur and don't happen to have a communications analyzer laying around the shack, don't despair. There are a couple of methods you can use to at least get in the ballpark without all the fancy test equipment.

The first (and best) way is to identify someone in your local area who has had his packet station correctly adjusted using the proper equipment. Then, by monitoring your signal and his signal on an independent receiver, you can adjust the level of the AFSK tones from your TNC to minimize the difference. This is facilitated by connecting to yourself through the station you are using as a deviation standard. Then every time you send yourself a packet, you will hear your signal first and his signal second on the receiver you are monitoring with. You can adjust your deviation until your signal sounds like his, or you can use an objective comparison like an oscilloscope or audio voltmeter on the monitor receiver output to make the comparison. Be sure to carry out this test on a simplex channel as a repeater may give you a false idea of the deviation present on the reference signal.

The second method also involves using a second receiver but is potentially much less accurate. It will, however, be better than overdriving your microphone input stages. This method assumes that the transmitter you are adjusting is operating properly and is equipped with a deviation limiter which is set to near 5 kHz of deviation (this is true of most commercially available 2 meter amateur equipment). Do NOT use this method on a Regency HR-2 series transceiver!

The procedure is quite simple.

Just plug a 10 ohm resistor into the external speaker jack on the monitoring receiver (check your radio for audio ground reference. Several FT208R speakers bit the dust during TAPR's Beta TNC project by using 10 ohm resistors referenced to negative DC ground!). You will be measuring the audio voltage produced across this resistor with an A.C. voltmeter. The A.C. volt scale on most modern multimeters will be fine for this measurement.

Connect your packet transmitter to a dummy load. Then, while sending the high tone in calibrate mode, adjust the audio level from the TNC from minimum upwards until you find the point at which the monitoring receiver audio output voltage no longer increases in proportion to an increase in the TNC output level. Be sure that the monitoring receiver volume control is set to a point where the receiver audio amplifier is not distorting. Most receiver output stages can produce 2 volts R.M.S. without excessive distortion.

Now, without touching the volume control on the monitoring receiver, adjust the AFSK audio level from the TNC until the voltmeter reads 1/2 of the previous reading. This should put you in the 2.5 kHz deviation ballpark.

That's all there is to it!

- PRM -

PSX — Packet Software Exchange

IBM-PC and MS-DOS

PAK/UNPAK

\$5 postpaid

This is a program for sending binary files between computers. Submitted by KA9AKM.

Behind The Scenes

Lyle Johnson, WA7GXD

The new TAPR Packet Video was released this summer and it has been very well received by the Amateur packet community. Over 100 copies have been distributed by TAPR alone, not to mention the many tapes that have been "cloned" from purchased copies.

(And, yes, you are welcome to copy the video so long as you don't sell the copy!)

Ever tried to make a home movie? If so, you can appreciate the kind of work that went into this production.

The actual taping of "Packet Radio" only took one evening (Pete, the "talking head," had it easy!); from taping to final duplication of the tape took well over a month! (Of course, the taping had to be squeezed in between the 10 P.M. News and the night shift who needed the gear for station business.)

THE VOLUNTEERS

Four Amateurs, who are professionals in the TV broadcasting industry, spent that month making the final product look first class.

Jim Wellinghoff, KOSBH, was the Producer and Director of "Packet Radio." Gil Ludwig, WA0YCY, was the Technical Director. Kent Lissa, WB00DX, handled the Audio while Phil Grason, WB0TBH, did the Electronic Graphics.

Jim coordinated the whole affair, and ensured that it was done in a competent and professional manner.

GRAPHICS

All the graphics (and slides) were digitized in a computer! Phil spent hours digitizing crude sketches and sloppy, handmade slides into professional graphics. The action scenes (the bouncing ball leaping from antenna to antenna) was a trick, too! It looks easy when you see it, but doing it (and getting it to go the right direction when you want it to) is another! All this work had to be double checked, tweaked and then "still stored" into memory.

Think we're finished? Not by a long shot! The next trick was to get these graphic images superimposed on the talking head at the right time! No simple feat, first the video levels had to be matched (using some oscilloscopes that would make you drool), then the 1 inch master tape was run back-and-forth to get the EXACT spot to "splice" the graphics in.

Sound simple? Try it some time!

PUTTING IT ALL TOGETHER

In the master control room, Gil oversaw the "melting" of the images, fading of the slide scenes, etc. This was accomplished using an array of panels that look like they belong on the Bridge of the starship "Enterprise."

Since the equipment to do all this is scattered throughout several rooms, communication had to be done via intercom and remote screens. Queues did not always work right the first time (or the second), and sometimes it got real frustrating, but Jim, Gil, Phil and Kent kept their cool through it all.

KSDK (Channel 5), the St. Louis NBC affiliate station where the work was done was most generous with the use of their facility. Gil, Jim, Phil and Kent enthusiastically donated their time (all after hours, sometimes real late and on weekends) to put "Packet Radio" together.

From the first outline of the Script to "in the can," Jim, KOSBH, had a can-do attitude as Director. He coordinated the use of the studio with the station, and pulled the rest of the talented crew together to pull the whole thing off.

GETTING IT TO YOU

Once the master tape was made, we needed to find a means of duplicating the VHS cassettes en masse, and at low cost. Enter Mike Phillips, WB6RHW, Staff Manager AT&T, Aurora, CO, who arranged the professional duplicating facilities and cranked out nearly 200 VHS copies of this production for TAPR to distribute!

TAPR is fortunate to have folks that are willing to donate this kind of time to a common goal. The unfortunate part is that they seldom get the recognition they deserve. Next time you watch the tape, play close attention to the credits at the end; there you will find the real artists that put the new "Packet Radio" video tape together.

"Packet Radio" is available from the TAPR office for \$10 postpaid. See the price list elsewhere in this PSR for ordering information.

- PRM -

Renewal Reminder

Please check your mailing label on the front cover of this issue of PRM. If you are a TAPR member, the label will look something like this:

WA7GXD Exp: 02-87
Lyle Johnson
5971 S. Aldorn Dr.
Tucson, AZ 85706

If you have no Amateur call in our records, the call sign part of the address label will be blank.

If this issue of PRM is your last, your label will proclaim that fact, as in the following example:

WA7GXD Exp: 12-86 LAST ISSUE!
Lyle Johnson
5971 S. Aldorn Dr.
Tucson, AZ 85706

Continued on page 14

HF Modem Performance

Eric Gustafson, N7CL

There has been much discussion about the performance of modems, specifically demodulators, for use at 300 baud on the high frequency amateur bands. Most of the performance claims that have reached me have been anecdotal in nature. There is a very good reason for this. Modem performance under the conditions experienced on the typical H.F. amateur band is extremely difficult to accurately quantify by laboratory measurement. This is due to the large number of variables (noise of various kinds, multipath, QRM, tuning error, etc.) that would have to be accounted for to make a meaningful measurement. This coupled with the expense of the equipment required to do the bit error rate testing places this kind of measurement out of the range of the average amateur. Fortunately, the average amateur isn't particularly interested in an absolute quantitative measurement anyhow. What he IS interested in is which of the several types of commercially available modems works best at HIS (or HER) shack on HIS radio hooked up to HIS antenna in HIS neighborhood noise environment. For this he only needs a means to make a valid RELATIVE performance measurement.

To facilitate this type of measurement I have been doing some work on H.F. with a version of the familiar XR2211 demodulator. This is a slightly improved version of the demodulator found in all of the TAPR TNCs and clones. In fact, the testing I have been doing on the air has been done on a modified TNC-2 clone. The schematic diagram of the "reference" demodulator is shown.

The test methodology is very simple. (Ten paces, turn and fire!) Two TNCs, one with the "reference" demodulator are fed the same audio from the same radio at the same time. Each TNC is hooked to its own computer which has an open buffer to store all the data monitored by the TNC. When the largest buffer reaches a reasonable size (15 to 20k), the test run is terminated and the buffer sizes are compared. By simply dividing the number of characters captured by the demodulator under investigation by the number of characters captured by the "reference" demodulator, a number representing a kind of "figure of merit" is obtained for the target demodulator. It is for this reason that I like to call the "reference" demodulator the DENOMINATOR demodulator.

All the test equipment needed to do this type of comparison is readily available to the average packeteer who has a packeteer friend who is willing to uproot his TNC and computer for this purpose.

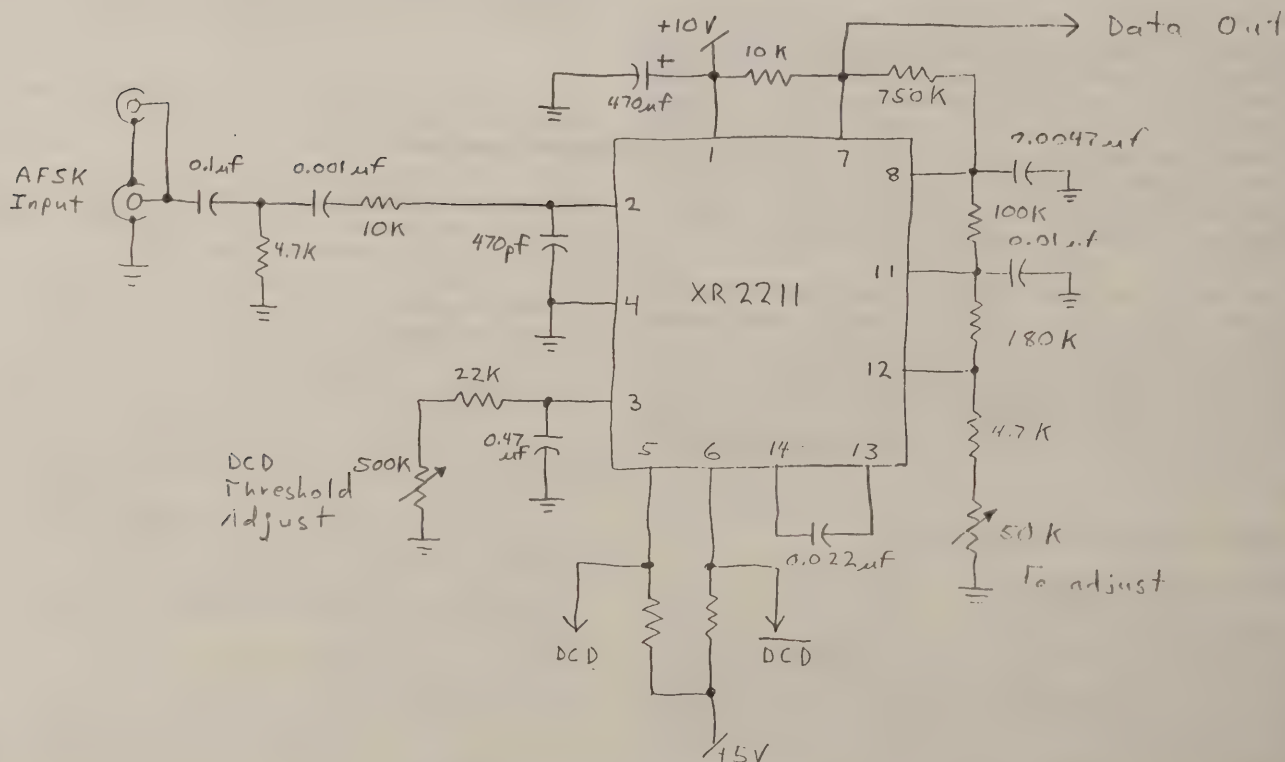
I will be writing about the results of testing several different types of demodulators under the conditions present at MY shack in a future issue. I will also be looking forward to results reported by others who are interested enough to duplicate this type of comparison.

Watch this space...

73 de Eric, N7CL

- PRM -

XR2211 AFSK Demodulator for 300 Bauds, 200 Hz Shift



TAPR Annual Meeting

Tucson Amateur Packet Radio will be holding its annual meeting during the weekend of February 21 and 22, 1987.

Your Board of Directors plans to meet all day on Friday, the 20th.

Friday night activities will include the traditional Pizza gathering, followed by racing at the Malibu Grand Prix.

Saturday, the Theatre Royale at the Embassy Suites Airport Inn (formerly Granada Royale) is reserved from 9 AM through 5 PM. The day's activities will include presentations from packeteers from various areas on numerous subjects. As in previous years, a catered lunch will be served.

Saturday night, we will gather at the Triple-C Chuckwagon Ranch for an old-fashioned western meal and entertainment.

Sunday morning the Theatre Royale is again reserved from 9 AM until 1 PM. This is to allow more and better presentations during the meeting.

The early afternoon adjournment should provide ample time for folks to drive home or catch a plane from Tucson International Airport.

More details will be published as the big weekend approaches. If you want to speak, please write to the TAPR office and let us know so we can begin planning early.

See you in February!

NOTE: Since the Board will meet on Friday, all voting must be done by mail. No ballots will be accepted at the annual meeting, so those of you accustomed to procrastinating until then will be find yourselves disenfranchised! Please vote in a timely manner, using the ballot that will be found in your January PSR.

- PRM -

New TNC-2 Software

Howie Goldstein, N2WX, is at it again! He has prepared a new release of software for the TNC 2 to utilize the new 32k byte RAM chips. This results in bigger buffers.

The price of the new CMOS RAMs has dropped from \$120 last year to \$20 today!

TAPR has the new chips in stock and expects to have the 1.1.4 software release available for shipment this month. As this is written, the software is being tested, and it is looking good!

See the price list in this PSR section for details.

- PRM -

TAPR Price List

The following price list is current for December, 1986.

Memberships (including renewals):

Associate (no PSR/PRM)
\$5.00/year
Full (PSR/PRM included)
\$15.00/year in the US
\$18.00/year in Canada
\$25.00/year elsewhere

Accessories:

HF Tuning Indicator Kit
\$25.00 postpaid in the US
(see October 1985 PSR for circuit)
FUJI/OSCAR 12 PSK Modem
To Be Announced
9600 baud Modem Semi-Kit *
\$25.00 postpaid in the US
(see K9NG article in 4th ARRL Proceedings)
N2WX FADPAD Xerox 820 Adapter *
\$25.00 postpaid in the US
(PC board and data only)
LSC-10 Coffee Mug
\$5.00 (only at Hamfests!)
(and the Annual Meeting...)

* These products are for experimenters and are neither complete nor supported by TAPR.

Education:

Introduction to Packet Video
\$10.00 postpaid in the US
(available in VHS format only)

TNC 2 Software/Hardware:

TNC 2 Software Upgrades
1.1.3 uses 16k RAM
1.1.4 requires 32k RAM chip (currently in testing)
\$12 postpaid
Reprogram your EPROM
\$2 plus postpaid return mailer
32k byte RAM chip, low power, 150 nSec
\$20 postpaid

OEM Packages:

TNC 1 OEM package
\$500 one-time charge
TNC 2 OEM package
\$5,000 one-time charge plus royalties

In addition, we stock spare parts for TNC 1 and TNC 2 units. Call or write for your specific requirements.

***TNC 1 owners - we again have the WD1935 and XD2212 ICs in stock.

- PRM -

It is that time of year again. Now that your TV screen is clear of the usual mud-slinging, acrimonious political advertising, it is time to consider something really important. I am referring to your TAPR Board of Directors.

As you probably know (but some of you newer members may not), TAPR is governed by a fifteen-member (15 -count 'em! That's more than General Motors!) Board of Directors. Each Director serves a term of three (3) years, and, due to staggered terms, one-third of the Board, or five (5) Directors, are elected every year.

The current Directors' terms expire as follows:

Mike Brock, WB6HHV		Feb 1988
Tom Clark, W3IWI	*	Feb 1987
Pete Eaton, WB9FLW	*	Feb 1987
Andy Freeborn, NOCCZ		Feb 1988
Steve Goode, K9NG		Feb 1989
Eric Gustafson, N7CL		Feb 1989
Skip Hansen, WB6YMH		Feb 1988
Lyle Johnson, WA7GXD		Feb 1989
Scott Loftesness, W3VS		Feb 1989
Dan Morrison, KV7B		Feb 1988
Margaret Morrison, KV7D	*	Feb 1987
Harold Price, NK6K	*	Feb 1987
Bill Reed, WDOETZ		Feb 1988
Gwyn Reedy, W1BEL		Feb 1989
Pat Snyder, WA0TTW	*	Feb 1987

Any member of TAPR may nominate any member for the Board.

To place a name in nomination, just send a letter to the TAPR office with the name of the person you wish to nominate (including yourself, if you like). It would be helpful if you would also provide us with your nominees telephone number and any qualifications you think your nominee has for the office.

We will then get in touch with him (or her) and obtain the person's direct consent to run. At that time we will ask for a statement from the nominee for publication in PSR. (We won't print your picture, so don't let that stop you!)

"What is required of a Director?" you ask.

A Director is expected to attend the Board of Director's meeting and TAPR Annual Meeting in February of every year in which he (or she) holds office. The meetings are held in Tucson, and TAPR does not reimburse expenses for this trip. This means, depending on where you live, a commitment of a few hundred dollars per year.

The Board of Directors reviews the previous year, establishes goals, elects the Officers, and generally guides the organization.

Deadline for Nominations December 15th, 1986
List of candidates and ballot January 1987

So, submit the name of someone you think will do a good job and get it in to the TAPR office today!

- PRM -

One of the signs of a healthy organization is the injection of new blood into the leadership of a group. TAPR, like any other collection of folks, needs new people and ideas to stay successful.

I made it known to the TAPR BoD this last summer that I would not seek reelection as an Officer. Since becoming involved with TAPR in the Fall of 1981 I've had a great time, but it is time for others to take the helm. Make no mistake, the whole experience has been rewarding. Hopefully, someone from the group will come forward. If you thrive on challenges and want to make a contribution to our hobby, please let the TAPR Board of Directors know of your interest.

As for myself I hope to stay involved by working on new projects. I've made a lot of very close friends over the last 5 years. It will be interesting to see what happens in Packet Radio during the next half-a-decade!

See you on the Network! Pete, WB9FLW

- PRM -

NEW OFFICE HOURS

The TAPR Office is once again open four days a week.

Office Manager Cris Kurz has decided her new daughter can be entrusted to her mother for a few hours a day (aren't grandparents wonderful?), and is now back to work.

Office hours are Tuesday through Friday, 8 AM until 4:30 PM Mountain Standard Time.

The best time for 'phone calls is after 1 PM.

NOTE: If you watch TV, Mountain Time is the one they never mention...

- PRM -

RENEWAL continued from page 11

In the old days, we would still send you an issue or two of PSR and hope you noticed you had expired. Nowadays, membership services are subsidized (which means we charge too little!), and PRM is a lot more expensive to publish than PSR, so we won't send any extra issues your way.

We are getting a program going to send you a reminder postcard, but that hasn't been completed yet.

If your membership is due to expire, please renew now. It only takes us a day or two to get your renewal processed, but we can't process it if you don't send it!

- PRM -

FADCA > BEACON

THE FLORIDA AMATEUR DIGITAL COMMUNICATIONS ASSOCIATION

Write Only Memory

By Ted Huf, K4NTA

Congratulations to all the winners (and losers) in the recent FADCA Board of Directors election. The results are printed in this section of PRM. I want to thank those who voted for me.

I am asked from time to time what is going on with 220 MHz linking. There was much talk about it earlier this year, but it might seem that not much has happened. Work is going on though but without a lot of fanfare. In the Broward County area, K4GFG and others are working on a dual port digipeater that will use high gain, highly directional beams pointed towards Naples on the West Coast and provide a link into 220 MHz.

In Lake Wales, groups from Tampa and Orlando have reactivated LKW on 145.01 and are working on the 220 MHz part of the system. I am not sure if it will operate as a dual port digipeater or a GATOR 2 Switch.

Howie, N2WX is working on a new improved version of the GATOR 2 Switch or pad that will support two ports, one say on two meters and one on 220 MHz.

I know that there are other groups around the state working on various linking projects but I will not go on here. Work is quietly being done.

Since last summer, I have operated my BBS on 145.01 and 145.03. All the BBSs South of Stuart moved over to 145.03 last summer in order to relieve some of the QRM on 145.01 in the heavily populated area of South Florida. My function was to interface between 03 and 01 for the rest of the Florida BBSs which are still on 145.01.

We have two stations in Florida, K4TKU and KOKBY, both in Miami, who do a fine job relaying messages to and from the "Big Local Area Network" on 20 meters. Joe, WD4KAV, has agreed to take over the 145.03/145.01 interface duties for me and I will move back to HF with one port of my BBS. Since K4TKU and KOKBY are doing so well on 20 meters, and since there are enough BBSs on 20, I have decided to operate on 7093 or 10.149, perhaps both.

I think that having a forwarding BBS here on 40 or 30 meters will help out on the short haul messages through out the South East.

The only thing holding us up right now is the lack of a two meter radio for Joe to use. It is hoped that we will come up with one soon.

Until next time, best of season greetings to all of you and happy packeting.

- PRM -

What Makes A Packet Network

Gwyn Reedy, W1BEL

FADCA President

Some local networking discussions have really sparked my interest and so I want to write in the FADCA>BEACON this month about this topic. Let me start by reprinting several BBS messages that have appeared recently. Some editing has been done to save space, but the ideas and opinions remain unaltered.

BBS Messages

Msg#	TR	Size	To	From	@ BBS	Date
510	QN	839	ALL	WA4GPF	ORLBBS	861125

The following is my opinion; how do you feel on this important subject?

* 220 Linking - Accessing the network *

The network may be thought of as a long distance line. On 220, all major digipeaters in the state will be linked together via new 9600 baud modems. All users, including BBS systems, should access the 220 network via 2 meter ports on their local LAN digi; NO users should access the 220 network directly on 220. Few if any users have the antenna height of the good digi; such a station transmitting directly on 220 can only degrade the performance of the network.

Msg#	TR	Size	To	From	@ BBS	Date
1638	F	4119	ALL	K4AHO	ORLBBS	861203

Recently Chuck Harrington, WA4GPF, started a survey to solicit opinions on whether users, including BBS'S, should be allowed on the 220 MHz Backbone system. This question and the responses it generated indicate a state of confusion concerning networking in Florida. Lumping the individual users together with BBS'S does a disservice to the existing network system. The many WORLI BBS'S in Florida are network servers (ie. serves many by forwarding and storing mail) and are integral parts of the network system.

In the past, users of the 145.01 MHz network system have complained the BBS'S have unfairly QRM'ed the channel making it useless for keyboard communications and have asked the BBS sysops to construct their own network (off .01) for forwarding. The Florida STAR is an outgrowth of that request but will be shared among all users. The forwarding of the BBS'S will be made as fast and transparent to the individual network user as possible. This will be accomplished by allowing the BBS direct access to the 220 MHz Backbone system. The BBS'S will forward directly thru the main 220 MHz digipeator if possible, or around the perimeter of the STAR. If this is impossible then the BBS'S

Continued >>>

will forward by using the 220 MHZ port of the local Dual-Port Switch, avoiding loading the 2 meter LAN frequency. The BBS secondary port will be accessible to local users on the LAN frequency. Accessing the 220 MHZ system thru the LAN 2 meter port will be considered the last resort because of the additional QRM to local LAN users. The BBS'S by accessing the 220 MHZ backbone directly and forwarding continuously will have a low average channel usage and a minimum effect on individuals using the backbone thru the 2 meter port. When the backbone is upgraded to 9600 baud the BBS traffic will become completely transparent.

There has been much talk about a "Hidden Terminal" problem. A "Hidden Terminal" in amateur packet radio circles is a user with a HT and minimal antenna which cannot hear any other user except the local digipeator. His packet have a strong likelihood of continuously "crashing" with packets of other users, thereby swamping the network and greatly decreasing the rate of data transfer. That is why individual users are asked to use the 220 MHZ system thru the 2 meter LAN port. The dual-port switch will acknowledge his packets and hold them until the 220 MHZ backbone can accomodate them. Also the individual will not need an additional radio and antenna on 220 MHZ to take advantage of backbone. The BBS'S (to avoid the hidden terminal problem) will need to have a station capable of hearing at least two other dual-ports to use the backbone directly. Otherwise the BBS should connect to and forward thru the LAN dual-port switch on the 220 MHZ side. Again this approach minimizes QRM to local users on 2 meters.

The consensus developed at the November 1st. North Florida Network Committee meeting held in Ocala supported the continuation of an uncoordinated network on 145.01 MHZ primarily for keyboard communications, as well as a user transparent 220 MHZ backbone system.

```
-----
Msg# TR  Size To      From    @ BBS  Date
1602 PY  1253 W1BEL   WA4GPF  ORLBBS 861130
```

I feel that we have a big problem with present efforts to begin 220 linking.....

I take great exception to the plans of some BBS operators to Transmit directly on the 220 backbone, and all but two responses of my "What is your Opinion" survey have thus far agreed with me. FADCA must provide leadership and direction, or surely 220 Networking with falter.

```
-----
Msg# TR  Size To      From    @ BBS  Date
563 BN   748 GRIPE   N4HAP   SRQBBS 861204
```

Comments:

It seems to me that I have been hearing more and more complaints about the operation of BBS's on 145.01 MHZ. I wonder if anyone ever complained about 2 meter repeaters being a source of QRM for those who wanted to work simplex on that particular frequency. It seems to me that the operators who wanted to work simplex on packet could move to

another frequency just as easily as asking the BBS's to change. The purpose of a BBS is to serve as a message center for traffic and mail. The question of "which one is more important? Traffic or ragchew." is a moot point. In my opinion the individual operator can change frequencies more easily than BBS's. The opinions exclaimed herein are only the opinions of N4HAP.

End BBS Messages

I agree with Jim, K4AHO, that networking is misunderstood. However, there are many different activities that fall under the name of networking, so one man's view of the situation may be another man's misunderstanding. Here, for what it is worth in layman's terms, are my comments about FADCA's network plans.

First, some homespun philosophy. Decide where you want to go, then decide how to get there. That is to say, don't let the destination be determined by chance or the course of least resistance. If you find that you cannot readily get to your destination, deviate from the best route in favor of a practical route, and accept some delays, BUT NEVER LOSE SIGHT OF THE DESTINATION! I believe the way to do this is to define and agree to an ideal networking goal and whenever compromises are required in the actual implementation, acknowledge them as such. When we hang a 'compromise' label on something it should serve as a flag meaning 'temporary - evaluate regularly for improvement.' Then we will not let ourselves believe later that the detour was really the desired path.

The "destination" or goal for our network should be a system that will [move digital data of any nature] [in a rapid fashion] [to any desired location] [in a transparent] and [reliable manner]. Those bracketed phrases define the elements of the network: Flexibility, Speed, Coverage, Convenience, Reliability. It is not possible to put upper limits on these elements - one can use all of each element that is available. Often, however, one element conflicts with another, and tradeoffs between the elements have to be made. All of the elements have to be traded off against cost, both individually and collectively.

Example: We have been wanting a 9600 baud backbone network for years, but the modem/radio technology has been slow to become available. Since we don't have the bandwidth or connectivity to make all of our connections on a real time basis, we have adopted the RLI BBS as a non-real time networking tool. However, we have not (I hope) decided that non-real time electronic mail (E-Mail) is the main or only purpose of our network building. It was a detour on the way to an ideal network where sufficient bandwidth exists for real time connections. The E-Mail has proven to be very useful and will remain useful for those conditions/situations where non-real time communication is preferable or when support for real time communication fails.

Example: Again in regard to a high-speed network, after long delays we have realized that it is more useful to build a backbone network with whatever speed equipment is available (even 1200 bauds) than

Continued >>>

to wait for the faster gear to become available. Of course, no one will argue with upgrading the speed when it is practical to do so.

In the following discussion I will refer to Bulletin Board Systems (BBSs) as the above messages do. Hank, WORLI may take umbrage at that term; He called his software a MailBox system. So are BBSs users of the network or part of the network? The only answer is both. They are a network of E-Mail servers that will be users of the backbone network connectivity. Because of the power of their services and the volume of their traffic, they may receive some special treatment by the network, and may suffer some restrictions not required of human users. This same condition will apply to other automated servers, and the higher layer protocols being debated for network control have provisions for fairly apportioning network resources.

How should BBSs be treated during the infantile stages of network implementation? They should be set up to use the minimum bandwidth necessary to effectively perform their function. This means, ideally, that they operate a user access port on a segregated local channel, and access the network indirectly with the other port for traffic forwarding. Also in the ideal case, non-BBS users access the network from a different local frequency, and purely local digipeating should be supported on yet another frequency. (If equipment considerations allow, the local channels may all have network access and there may be multiple BBS and local channels, etc.)

The above term 'indirectly' referring to BBS network access means a private link frequency from the BBS forwarding port to the network node. This will be expensive in equipment and may not be possible at first. Two alternatives exist: 1) Put the BBS forwarding port directly on the network frequency, or 2) have the BBS be accessed by users and also do its linking to the network for forwarding on the same frequency (not the network frequency).

The problems with solution 1 (BBS directly on network) are that BBS equipment needs to be located near the SYSOP since it requires much human interaction, and network nodes need to be in good RF locations. Usually the two locations are not the same. This is where the local terminal problem comes in (and I believe Jim greatly understated the problem.) If the BBS has a port on the network frequency to attach to the network, it will very likely interfere with operation of the network. It cannot hear as well as the network node, so will transmit on top of weak signals from a distant node. Likewise, the distant node will not be able to hear the signal from the less powerful BBS antenna and will collide with BBS transmissions to the node. In both instances network performance will suffer.

Solution 2 (BBS access and forwarding on the same frequency) reduces the responsiveness of the BBS to local users somewhat, but that is still a big improvement from the present situation where everything (BBS access and forwarding, and all local digipeating) is done on the same frequency.

To summarize an article that is getting too long: The network goal to provide flexible, fast, convenient, and reliable coverage over a widespread area can be best achieved by having only dedicated special purpose network node stations on the network frequency, with multiple network entry points in each local area. These multiple local frequencies can segregate normally incompatible network uses [BBS access, human to human QSOs, and machine to machine (binary files, digital video, etc.)] There is no need to segregate these uses on the network itself.

If we cannot establish such an ideal network initially, at least we should carefully evaluate our shortcuts so we can fix them later. Beware the temporary fix that becomes permanent! Specifically, we should use caution letting BBSs THAT ARE NOT UP TO FULL NETWORK NODE RF SPECIFICATIONS transmit on the backbone frequency, lest the temporary expedient become permanent and cripple the future operation of the network.

As they say on the radio editorials, "Opposing opinions will receive equal time." What do you think?

- PRM -

Brevard LAN News

Bill Newkirk, WB9IVR

Amateur radio exams are held on the third Saturday of each month in Melbourne at Florida Institute of Technology. Exams start at 10 AM and are held in Shepard Hall in the "jungle" section of the FIT campus. Exams are coordinated by the ARRL/VEC. For more information, message WB9IVR @ N2WX or call (305) 724-6183.

The SBARC Novice class is almost over with over half of the students already waiting on their Novice tickets to arrive from the FCC and four passed their Technician exams recently. The next class will be starting in January of 1987. This will be a completely revamped class including new texts that include sufficient material for those wanting to work directly on their Technician or General Class license and to cover new material required by the proposed Novice Enhancement Proposal. The class will again be held under the auspices of the Brevard Community College Adult Education System at Hoover Junior High School in Indialantic. It's expected that class fee and books will come in under \$50.

The South Brevard Amateur Radio Club's newsletter, The SBARC Aardvark, is available on the N2WX-1 BBS system. Are there other clubs working on this novel way of distributing their newsletters? Message WB9IVR @ N2WX I'm interested in finding out formats, how you handle graphic information, and compress the data storage required for the typical newsletter (usually greater than 20 kilobytes for the typical Aardvark).

A digipeater is now up and running in the Cocoa, Florida, area. Call sign is W4REN. Running low power (8 watts) while system testing is in progress.

- PRM -

Packet Computing Possibilities

Chuck Harrington, WA4GPF

I found myself reminiscing today about packet radio, and what a fantastic year it has been! I also did some thinking about what changes the new year may bring to packet radio. I decided that it might be fun to make some predictions as to what packet will be like a year from now; so here goes.

The year 1987 will be a time for linking on 220; it will start off slow but I predict by the end of the year that most of Florida will be connected. The exception to this will be the panhandle area, which will unfortunately remain pretty much isolated from the rest of the state in 1987. Many users, including BBS systems will move off 145.01 onto their local LAN frequencies. Unfortunately, as the BBSs move off they will be replaced by new BBS systems in many cases, and 145.01 will remain as congested as it is now, or worse. The LAN frequencies will also be crowded by year end, and there will be a need for a second channel assignment in LANS which contain the larger cities.

The congestion will be caused by an influx of new packet stations, in fact I estimate that the number of packet users will more than double in 1987! Also contributing to the congestion will be the increased use of packet for serious purposes; file transfers, NTS messages, and other new uses will keep our packet channels humming in 1987. The "Novice Enhancement" will bring many new hams into packet radio, and quite a number of them will be computer enthusiasts who are attracted to ham radio with the thoughts of working 220 packet. Because of this, the major equipment manufacturers will market new rigs for 220, and by year end the new frontier for packet will be 220, with it's vast room for additional packet channels. Quit a few of us will be on 220 with these novices, and we may find that while they are beginners in radio, that some of them are computer wizards that have a lot to contribute to packet radio.

The BBS system will change greatly in 1987, as the Xerox 820s are gradually replaced by 16 bit machines with hard disk capacity and more memory. Some of the Xerox 820s may remain for mailbox use only, but the traffic will be so heavy that there will be little room for downloadable files. RLI type commands will remain standard, although many enhancements will be made to BBS software. The new BBS systems will have a lot of Public Domain software as the Packet BBS systems "come of age" and more closely resembles typical telephone BBS systems as they currently exist.

In 1987, the multiuser features of the new TNCs will be greatly used, and roundtable type QSOs on packet will be common by year end through the use of new TNC and terminal software. The 2400 baud rate will not catch on, though used by a few from time to time; most of us will continue to use 1200 baud on VHF in 1987. I expect to see at least one new TNC in 87, that will be a big technological breakthrough and that may set the stage for big changes in the future

Our computers will change in 1987 too, with the Commodore 64 continuing to be replaced by IBM clones or 16 bit machines by many users; this has already started to happen in the past few months. At year end, the C-64 will still be popular, but many will have been upgraded.

All in all, 1987 will be an exciting year. Linking is going to be a lot of work, and we need to do what we can to prevent some of my predictions from coming to pass. I really want to see 145.01 become a channel free of BBS system traffic, where we can all DX or just enjoy real time connects across the state. Also, I don't want to see the Florida panhandle isolated; we need to do what we can to see that this prediction is not realized!

Well, those are my predictions for 1987; perhaps a year from now we can reflect about their accuracy. In the present, I am happy to report that PACK-ET-TERM, my free packet radio terminal program for the Atari ST, successfully transferred itself from Orlando to Jacksonville via the the K4OZS BBS in Ocala. The program was a 29K binary file that was transferred in 11 pieces. With a lot of interest in getting BHP (Blocked Hex Protocol) implemented on the C-64, I think my prediction of a lot of file transfers was pretty safe. By the time you read this in PRM, the details of the BHP protocol should be available on the Florida BBS system, and I will try and get it into next months PRM. Also, I expect to release PACK-ET-TERM version 3.2 in January, which has the BHP file transfer implemented in it.

Let me wish all PRM readers and packet users everywhere the happiest of New Years, and I hope to be connecting with many of you in 1987.

- PRM -

National Digipeater Survey

Bob Schlusser - N4BLD @ K4AHO
P.O. Box 140948
Orlando, FL 32814-0948

During the previous month many of you have probably seen my digipeater survey form on your local packet BBS.

What I am trying to do is create a computerized database of all the packet digipeaters in the country. I decided to tackle this project after trying to find a current digipeater map or connectivity matrix for Florida and the best I could find was something dated November 1985. I thought about it and figured that if there was a lack of current data for Florida it was likely that a similar problem existed in other parts of the country. I designed the survey form and put it on the local BBS for forwarding to the rest of the country. As I had hoped, the BBS forwarding system worked and I began to receive completed surveys.

The information stored for each digipeater includes both background information (call sign, frequency, location, etc.) and connectivity information. I have written a program that processes the database and automatically generates a connectivity matrix.



RMPRA > PACKET

The Official Newsletter Of The Rocky Mountain Packet Radio Assn.

Dateline:

The Continental Divide

Bob Gobrick, WA6ERB
President, RMPRA

HAPPY HOLIDAYS: The RMPRA gang would like to extend a Happy Holidays Greeting to all PRM readers. If you think 1986 was exciting in packet radio just wait to see what 1987 has to offer.

NEW TOY FOR CHRISTMAS: The newest packet toy in the Rocky Mountain area and what may be the Xerox 820 of the GTE world is the GTE XT300E ActionStation. The ActionStation is a semi-dumb (semi-smart) terminal with a 80 column 9 inch screen, full ASCII keyboard, built in two line telephone/speakerphone, 12 key telephone pad, built in 300 baud modem, two RS-232 serial ports and firmware that supports a 50 memory dialup/connect/logon sequence with control of the RS-232 ports, text editor and a host of other bells and whistles. The unit was built in France (I imagine for the grand Franco government project of having a teleterminal in every French home) and listed for \$1295. Well in the grand style of the Xerox 820 computer, GTE is dumping these brand new units for \$245 (and fully assembled at that). Well how does it work with packet - Magnifique. I have used my unit with the TNC-2 and AEA PK-232 (turn FLOW OFF in both cases) up to 9600 baud. The second serial port comes in handy when using a serial printer for hard copy. It is a real pleasure not tying up my computer for packet and at the same time having a nice full screen of text. This becomes even more exciting when you receive a phone call on your telephone/speakerphone and you proceed to carry on a conversation while you type a message on packet (sort of leads to nervous breakdowns - but that's normal for packeteers). The unit is available from your local GTE Communications Center or 404-441-1314.

MORE NEW TOYS FOR CHRISTMAS: Well the good old TAPR TNC-2 has only been out for a year and a half and already we are beginning to see second generation equipment cropping up (it's nice to see our American manufacturers marketing like the Japanese). Some new toys that have been just introduced:

AEA: Following in the footsteps of the popular PK-64, PK-80 and the very popular PK-232 multimode data controller comes the PK-87. The PK-87 is AEA's TNC-2 replacement with a bevy of new features: new firmware commands, software selectable modem tones and terminal baud rates, additional LED's (you really do need to have some BELLS and WHISTLES for your money - Kantronics KAM take note). Internally, the TAPR specified modem header disconnect remains (needed for future linking and AMSAT applications) and looks like the AMD 7910 World Chip demodulator has replaced the EXARs.

PAC-COMM: Everyone is waiting Pac-Comm's newly released single and dual ported digis - the DR-100 and DR-200. Many folks who are experimenting with Level 3 switches and TCP/IP internet protocol have

orders in for the two ported version in anticipation of moving to higher frequencies and higher baud rates for level 3 transmission. It looks like the le ported DR-100 will make a nice compact and inexpensive Level 2 digi or Level 3 Switch. Right after these two releases Pac-Comm let loose with the new TNC-220 (replacing the TNC-200). Again we see the AMD 7910 World Chip demodulator but this time it is configured to be software switched between two radio ports, allowing VHF and HF hookups. An active HF band pass filter is included and options call for a future internal tuning indicator. The modem disconnect still remains standard. The price of the kit and wired unit is very attractive considering the price increase of the popular MFJ 1270.

GLB ELECTRONICS: One of the classic digipeater TNC's is the GLB PK1L which now has a new lower price. Out here in the Rockies one of the most reliable mountain top digis to date (knock on wood) is Steve KOGUZ's Sunlight Mountain unit. The digi has been chugging along for near a year on the 25ma GLB PK1L. If you are looking for a very low current drain unit (solar cells will probably do it) the PK1L is the unit.

KANTRONICS: Like the AEA PK-232, Kantronics has just introduced their new multimode data controller the KAM (Kantronics All Mode). The unit relies heavily on the features of it's popular UTU-XT unit and should be a good seller. Like the KPC-2, the KAM does not follow many of the standard specifications of the TAPR TNC-2 so don't plan on TNC-2 type firmware upgrades or easy access for an external modem disconnect. Kantronics is also offering VHS or BETA packet videos (watch out MTV) and software packages for popular computers.

MFJ: I don't know what MFJ has in store, but you can bet whatever it is it will be a tough act to repeat their very successful MFJ-1270. I have still found the MFJ to be the best RFI-proofed units out of the TNC-2 clones (and I have owned one of each). It seems that when they redesigned their PC board to accommodate the TTL interface they added just a little more ground plane in to make the difference.

COMPUERVE HAMNET: TAPR has finally moved DRNET to Compuerve's Hamnet and things are getting pretty lively there. The Grandfather of Packet Radio, Lyle Johnson, WA7GXD, (he really isn't that old) has been checking in fairly often and hosting quite a few questions about packet. It's a pleasure to read Lyle's responses. To update everyone about Compuerve - the Hamnet section (GO HAMNET) is the place where it's all happening. Scott W3VS (a TAPR Director) has been hosting Hamnet from the beginning. Hamnet is broken up into a number of subsections such as the Roundtable, Satellite, SWL, etc. The subsections of interest to packeteers are S9 - Packet/RTTY/AMTOR and the new S7 - TAPR - DRNET. If you have a question about packet or would like to follow the latest thread on where the leading edge of packet is this is the place to be. Sign up and give Compuerve a try - if you need help, Scott and

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Those Funny Packets Down In the Springs...

Bdale Garbee, N3EUA

At about 10:30am on Saturday, 22 November 1986, Andy Freeborn, NOCCZ, and I became a footnote in the packet history books by being the first people to have a successful TCP/IP [Transmission Control Protocol/Internet Protocol] transaction on the air using AX.25 UI frames for a true datagram-oriented protocol.

The software we used was the TCP/IP protocol package written by Phil Karn, KA9Q, and myself, along with the implementation of the KISS host-to-TNC protocol written by Mike Chepponis, K3MC, for the TNC-2 hardware. The hardware on each end consisted of PC clones connected to TNC-2s with KISS ROMs. Despite a poor RF path between our locations, we managed to have a lengthy keyboard-keyboard Telnet session, while I simultaneously transferred a 12k file from Andy's PC to mine using FTP [File Transfer Protocol]. On-air testing of the SMTP [Simple Mail Transfer Protocol] Mail implementation (which is my contribution to the TCP/IP package) will occur before you read this.

So what's so special about all this? TCP/IP is the name of a family of protocols that implement a layered network originally developed under DOD grants for use on the Arpanet, and which is now widely used as a de-facto standard in both the academic and commercial worlds. Implementations of the protocols are available for everything from PCs and Macs to the Cray supercomputers. A discussion of the relative merits of the TCP/IP protocol family would take more space than I have for this article. Let me just say that they are one available option for the "next generation" of packet operation. In my humble opinion, they represent the BEST option.

Andy and I are currently working on getting the kinks out of the software, and determining by trial and error the best parameters to use for the lowest protocol layers for real on-the-air use. The higher levels of the protocol family have been thoroughly tested already using hardwired lines to my Unix system here in Colorado Springs, and by Phil Karn against a different manufacturer's Unix system at his home in NJ. All of the code is written in C, and currently runs on the Xerox 820 and IBM PC compatibles. It should not be difficult to port to any system with reasonable resources and a good C compiler. And unlike much of the existing packet software, we are releasing full sources for distribution.

Andy and I are already making plans to install the first IP Switch in Colorado Springs. The closest analogy in the current packet scene to a packet switch is a digipeater, but a switch is much more! For one thing, operation through a switch is essentially transparent, in that you will not have to explicitly specify the routing.

Once we have a switch on the air, we will be working to get more hams on the air running TCP/IP in Southeast Colorado, and will simultaneously be working with the folks in Denver to get a switch on the air there. Our current plans for starters are to use IBM PC clones for the switches, equipped

with TNC-2s. Software is almost complete for the Pac-Comm PC-100 card, which will make it easy to use one frequency for local operation, and a second to link the switches. Once the software is more stable, the hardware requirements for each switch will be reduced to a PC clone motherboard, power supply, PC-100 card, and RF gear. The software will be placed in ROM in the sockets normally used by BASIC. For now, it will be easier to test and twiddle with full clones at each switch, and the software on floppy.

If you want to learn more about TCP/IP, or just networking in general, there are a couple books you should check out. One is called "Computer Networks" by Tanenbaum. This has a good explanation of Datagram vs. Virtual Circuit networks, addressing, and so forth. Another book which is very pro-TCP/IP is Padlipsky's "The Elements of Networking Style". Finally, there are a large set of papers collectively called "Requests for Comments" that are published on the Arpanet, the more interesting of which are available on my Fido phone BBS, along with all of the sources and executables to the software we are now running. The BBS can be reached at 303/593-0766, 300/1200 baud. Make sure to leave me a note if you check in. I'll be happy to try and answer any questions about what we're doing, and/or to help anyone get on the air with TCP/IP!

- PRM -

DATELINE continued from page 19

some of his assistant sysops like Norm, W2JUP, (author of PK-232 manual) and Jim, K9EI, (author of "Get ***CONNECTED to Packet Radio") are available to help out..

KISS IN COLORADO: This month's RMPRA lead article is an update status of KISS in COLORADO (this is not a rock group) by Bdale Garbee, N3EUA, of Colorado Springs (home of the Olympics Hall of Fame). Bdale is one of the prime coders of the TCP/IP code effort kicked off by Phil Karn, KA9Q. If we in the Rocky Mountains may boast a little - (until proven differently) RMPRA takes claim to the first live amateur packet IP datagram QSO using the TNC-2 KISS code. Bdale and Andy Freeborn, NOCCZ, reconfigured their TNC-2 EPROMs with new code and carried on the first QSO on November 22.

- PRM -

RMPRA MEMBER NOTE: As a reminder, please check your mailing label for expiration of your RMPRA membership. If you have any corrections please contact the RMPRA membership chairperson Norm Miller, NOENN.

- Membership: **NEW POLICY** - RMPRA annual membership dues are \$20 for new members and \$15 for renewing members which includes a year's subscription to Packet Radio Magazine (including TAPR's PSR) and the quarterly RMPRA>PACKET regional newsletter.

- Newsletter material for RMPRA - by mail, Compuserve Hamnet (70466,1405) or WA6ERB PBBS via KOHOA HF Gateway.

- Address for all RMPRA business:

Rocky Mountain Packet Radio Association
Bob Gobrck WA6ERB 303-986-0189
14311 W. Virginia Dr.
Lakewood, CO 80228

- PRM -

TEXNET Network Update

Tom McDermott, N5EG

(Reprinted from TPRS Nov 1986)

In the last three months the following progress has been made towards getting the TEXNET network running:

1. We got the K9NG modems, and the FM-5 220 Mhz. radios running and passing traffic at 9600 bps. The statistics: during a four hour period on Sunday, November 16th, over 4000 packets sent/received with 94 retried, a throughput efficiency of 98%. We used 220 Mhz, FM-5's running 7 watts at both N5EG's and WB5PUC's locations. N5EG's antenna is at 90 feet, receiver front-end has a stripline filter to knock out image reception from the channel 11 and 13 carriers. WB5PUC's antenna is about 20 feet, no filter. The path is 12 miles by air. Signal levels were full quieting.

The K9NG modem is a very good modem, but there appears to be considerable variation in the performance of different FM-5 220 Mhz transceivers. In order to compensate for the performance differences in our FM-5 radios, we made about 10 modifications to the modem, the most significant of which involved adding an adjustable group-delay equalizer (at baseband). This circuit cancels some of the undesirable time-delay distortion introduced by the 455 khz ceramic IF filter on the FM-5 radio, and resulted in a significant improvement in the received 'eye' pattern.

Other changes in some of the coupling circuit time constants, the decision-level generation, and the addition of some hysteresis in the carrier-detect circuit were also made. With this, we were able to very reliably pass data at 9600 bps. Unfortunately, the path length is limited by the FM-5 radio, as TV channels 11 and 13 video carriers render the radio almost unusable. We've built an RF filter to improve the front-end selectivity of these radios. Because of all of these problems, and the difficulty of others being able to duplicate our results, we are looking quite seriously at using 440 Mhz. converted commercial radios for the high-speed network links instead of the FM-5. Tests with the FM-5 radios at 'normal' link distances will continue.

2. TEXNET will utilize the WB5PUC's software. Tom Aschenbrenner, WB5PUC, has re-coded all of the TEXNET software layer-3 code from 'C' to assembly, reducing the size of the code, thus fitting the layer-2, layer-3, and numerous other features into a single 16k-byte EPROM. He has improved the quality of the code, added much better error handling, and added many features. Tom has done an incredible amount of work on this package, starting in January 1986, and working full-time on it since. It is doubtful whether the project could have ever gotten off the ground without his effort.

3. The software has both TNC-2 'clone' and also TEXNET NCP compatible versions, for single or dual ported network nodes, respectively.

4. Four TEXNET network nodes are up and on the air in the Dallas area. We are currently using the 2-

meter 1200 baud links as inter-nodal trunks until the high-speed radios are ready. The TEXNET datagram based layer-3 protocol has been shown to work quite well. Our tests of the datagrams show very rapid response with 9600 baud links between the nodes.

5. WB5PUC has added a number of very nice features to the network nodes, including statistics formatting, network time-keeping, numbered network error codes, and he is working on some future network features and enhancements.

-PRM-

TEXNET

Design Review/Preview

Texas Packet Radio Society (TPRS)

P.O. Box 831566

Richardson, TX 75083-1566

(Reprinted from TPRS Nov. 1986)

The initial plan is to put nodes in place from the Dallas/Ft. Worth area to Waco/Temple as phase 1. This will be a test of the network hardware in an installed configuration. We want to thoroughly test the node under actual environmental conditions. We'll need to install 3 to 4 nodes approximately 30 to 40 miles apart to reach the Waco/Temple area.

Phase 2 of the network installation will branch south to San Antonio and southeast to Houston. The spacing will be much the same. By this time, whatever engineering challenges found in phase 1 will have been removed from the nodes we place in this phase. We believe an additional 7 to 8 nodes on each leg will be necessary to reach San Antonio and Houston from the Waco/Temple area.

The challenge:

To complete the work for Phase 1 and 2, the society needs this essential help:

1. Amateurs and clubs to do the "legwork" involved in securing sites (starting now).
2. Amateurs and clubs experienced in digital and PC board construction to join the "assembly line parties" we'll be organizing to build the controllers, modems, and power supply/battery chargers for the nodes. (sometime after 1/1/87)
3. Amateurs and clubs to secure radio equipment, particularly the 2 meter transceivers that will be necessary to provide a local port on the network (beginning now).
4. Amateurs to do the tower work to install the nodes.

If you or your club would be interested in any of the listed activities please send Tom McDermott or Bill Wade. Message either via the MWD mailbox or via US mail. We'll be organizing activities to be scheduled in the next few months.

If you have a site that you have already secured access to and/or you have the authority to approve the placement of a network node, TPRS would like to talk to you. Please send a letter or message to us.

TPRS can and will supply the technology to other groups and clubs to help build network nodes. The idea of a small network to Houston and San Antonio from Dallas/Ft. Worth is to provide the central core of a system that will cover the entire state. Nodes can be placed by other organizations and can be coordinated with the nodes placed by TPRS. TPRS is not going to be able to totally blanket the state without help from other organizations. If your organization is interested in a cooperative effort or in organizing your own "assembly line parties" please contact us and we'll bring you up to date on the specifics of the hardware and software design.

Bill Wade
600 Via Sevilla
Mesquite, Tx 75150

Tom McDermott
265 Daniel Dr.
Plano, Tx 75074

-PRM-

Additional TEXNET News

By Bill Wade, WD5HJP

(Reprinted from TPRS Nov 1986)

1. On November 3rd, we took delivery of 12 used series 700 RCA 450 Mhz rigs from the city of Dallas. These mobile transceivers had been removed from service and were put up for bid. These PIN diode switched radios are crystal controlled, phase modulated, double IF receivers with 25 watt transmit amps. There are many of them currently in use as

SURVEY continued from page 18.

This means that it is a relatively simple matter to generate a current connectivity matrix whenever the database is updated. I am also working on a program which will use computer graphics to generate a digipeater map. Further, by collecting data from the entire country, I hope to eliminate the need for parallel efforts by other amateurs.

The initial response to the survey has been very encouraging. I have received completed surveys from various parts of the country including Florida, Massachusetts, Washington D.C., Mississippi, Maryland, Georgia, New York, Iowa, Minnesota, Nebraska, Connecticut, Kentucky, and New Jersey. Data for Florida is almost complete and I hope to release a current connectivity matrix for the Sunshine State within the next week or two. I will release a connectivity matrix for each state as the data for the state becomes complete. The matrices will be available via the packet BBS system and will hopefully be published in future editions of this newsletter.

However, for this project to succeed I need your Help. If you are a digipeater operator or trustee and have not already done so, please complete and return a digipeater survey form. You should be able to find a copy of the survey on your local packet BBS. The survey is addressed to DIGIOP. To find it you can use the "L> DIGIOP" command (WORLI and compatible BBS's). Please send me a message if you cannot locate a copy of the survey on a BBS in your area.

The usefulness of packet radio for other than

amateur repeaters, so they have a known track record. We'll be modifying them for 9600 baud FSK transmit capability and broadening the response of the receiver IF's for use as the network spine.

2. Use of these radios will require a minor size modification of the box we had intended to use to house each of the net nodes. Also the battery charger/power supply will be modified to accommodate the increased current needed. We believe we'll be gaining a much improved reliability and an improved S/N figure for each of the links.

3. We've arranged to have the equipment aligned and tested by a ham very familiar with the rigs here in the Dallas area. We anticipate being able to set up a test of the radios and nodes running at 4800 baud within the next few weeks.

4. There is the possibility of obtaining more of these radios for use as additional links in the network. Currently RCA is out of the 2-way radio business and more of this type of equipment will become available throughout the state as municipalities, utilities, etc. replace them.

5. We have contacted the Texas VHF-FM Society to coordinate a single wide channel simplex frequency for use throughout the state. The frequency we'll be using is 445.1 Mhz. Although we'll be simplex, we had asked for a coordination so that TEXNET will not interfere with other amateur operations.

-PRM-

local communications is directly proportional to the amount of current and accurate connectivity data available to the operator. I hope the results of this survey will benefit both experienced packet operators and newcomers to packet radio.

- PRM -

Results of the FADCA 1986 Board of Directors Election are as follows:

W1BEL	Gwyn Reedy	Brandon	177 votes
K4NTA	Ted Huf	Stuart	174 votes
N2WX	Howie Goldstein	Melbourne	147 votes
K4AHO	Jim Diggs	Orlando	130 votes
K4OZS	Larry Phelps	Ocala	127 votes
W4PCM	Dick Klein	Jacksonville	102 votes
WA4GPF	Chuck Harrington	Orlando	95 votes
WA2HFA	Robert Jankuv	Boca Raton	83 votes

Congratulations to all!!

Jim Diggs, K4AHO, FADCA Election Manager

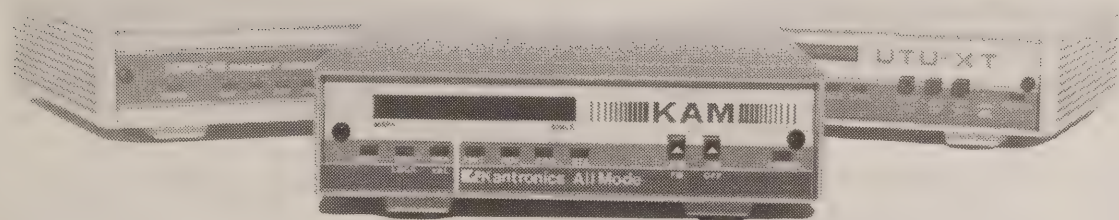
- PRM -

TROPICAL HAMBOREE
Miami, Florida
Feb. 7-8, 1987

The 27th annual Tropical Hamboree will be held February 7-8, 1987 at the Dade County Youth Fair grounds. This year the theme of the Hamboree is the 'Future of Ham Radio'. Packet radio will play an important part of the future of ham radio. One of the speakers will be Lyle Johnson, WA7GXD, president of TAPR.

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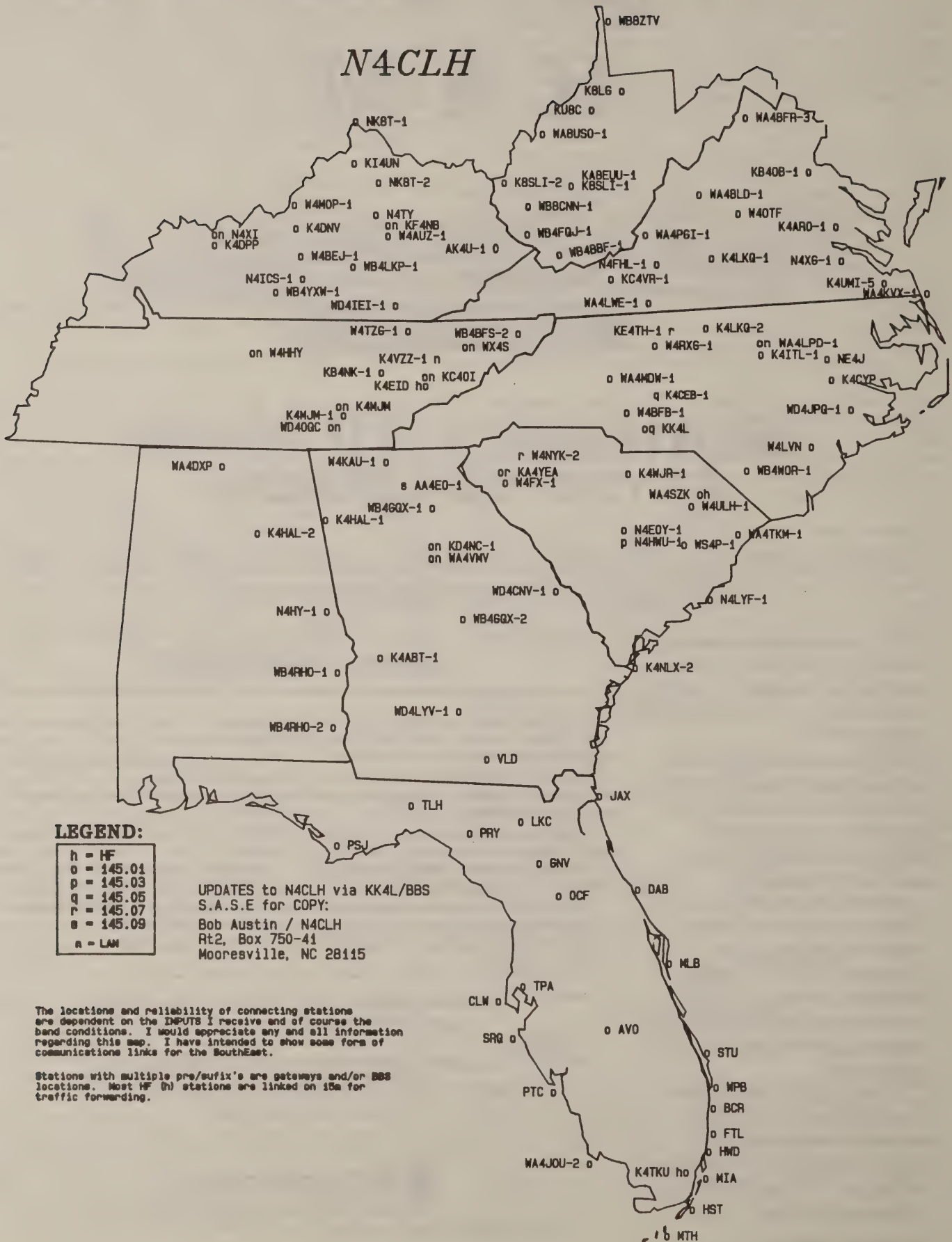
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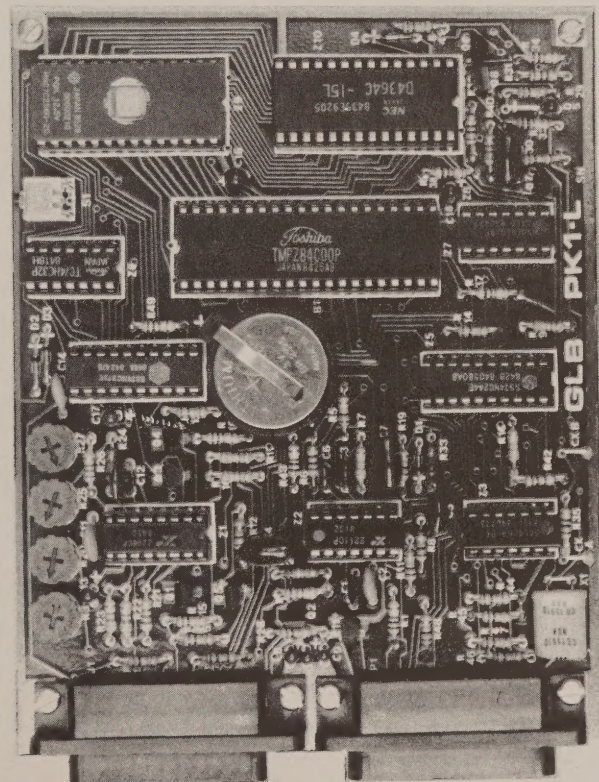
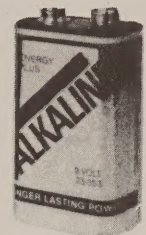
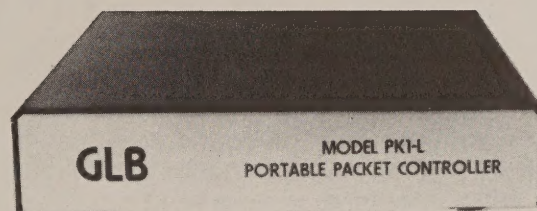
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First, A Good Idea

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Second, Computer Compatible

It doesn't matter what kind of computer you have, we have a Pakratt for you. The PK-64 works with the popular Commodore 64 or 128, and the PK-232 works with any other computer or terminal that has an RS-232 serial port. The PK-64 doesn't require any additional programs. Simply connect to the computer and transceiver and you're on the air. The PK-232 needs a terminal or modem program for your computer. The one you're using with your telephone modem will work just fine.

Fourth, AEA Quality and Price

Not many manufacturers like to discuss quality and price at the same time. AEA thinks you want high quality and low price in any product you buy, so that's what you get with the Pakratts. Ask any friend who owns AEA gear about our quality. The people who buy our products are our best salespeople. As for price, the PK-64 costs \$219.95, or \$319.95 with the HF option. The PK-64A, an enhanced software unit with a longer flexible computer cable, costs \$269.95 or \$369.95 with the HF option. The PK-232 costs \$319.95 with the HF modem included. All prices are Amateur Net and available from your favorite amateur radio dealer. For more information contact your local dealer or AEA.

Prices and specifications subject to change without notice or obligation.

PAKRATT™ Model PK-64



PAKRATT™ Model PK-232

Third, Performance and Features

The real measure of any data controller is what kind of on-air performance it gives. While the PK-64 and PK-232 use different types of modems, both give excellent performance on VHF. The optional HF modem of the PK-64 uses independent four-pole Chebyshev filters for both Mark and Space tones, and A.M. detection. The HF option can be factory or field installed.

The PK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The internal modem automatically selects the filter parameters, CW Fc = 800 Hz, BW = 200 Hz; HF Fc = 2210 Hz, BW = 450 Hz; VHF Fc = 1700 Hz, BW = 2600 Hz.

The PK-64 uses on screen indicators to show status, mode, and DCD (Data Carrier Detect) while the PK-232 uses front panel indicators. Both units use discriminator style tuning for HF operation. And that's just the tip of the iceberg. Features like multiple connects on packet, hardware HDLC, CW speed tracking, and other standard AEA software features are included in both the PK-64 and PK-232.

AEA

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